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THE ELECTRICAL EXHIBITION AT PARIS.

The engravings on this page present so clearly the plan and surroundings of the International Exhibition of Electricity at Paris that any verbal description would be superfluous. The exhibition, which opened August 11, 1881, is held in the great Palace of Industry originally erected for the World's Fair of 1855. The palace fronts upon the magnificent avenue of the Champs Elysées, in a triangular park between the avenue and the Seine. Views of the Champs Elysées front and the side toward the river are shown in the engravings. The naked interior of the great hall, and the same room when decorated with flags and filled with electrical exhibits, are shown at the bottom of the page. At the top are plans of the ground floor, showing the allotment of space to the several countries exhibiting, and of the galleries divided into apartments for special classes of exhibits, salons, lecture room, and the like.

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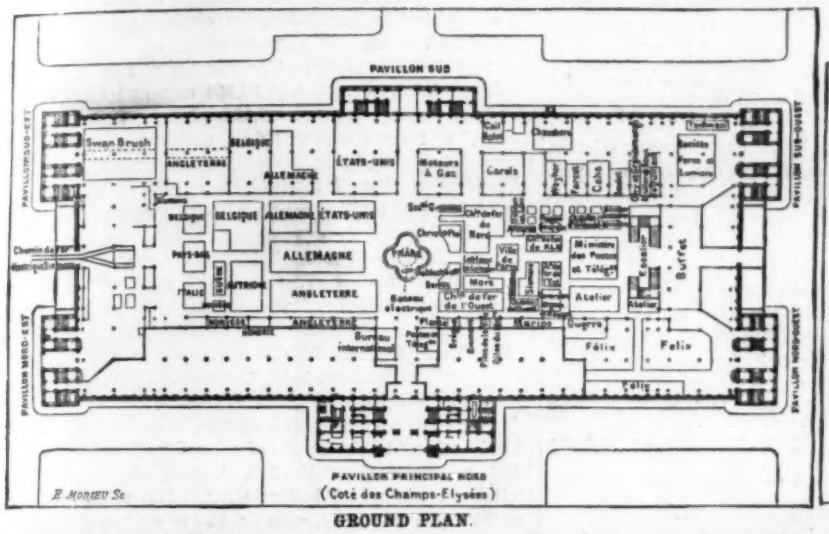
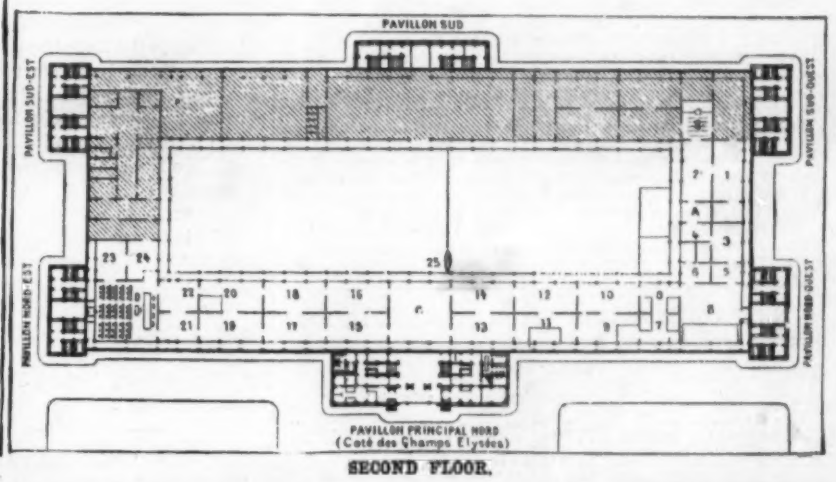


GROUND PLAN.



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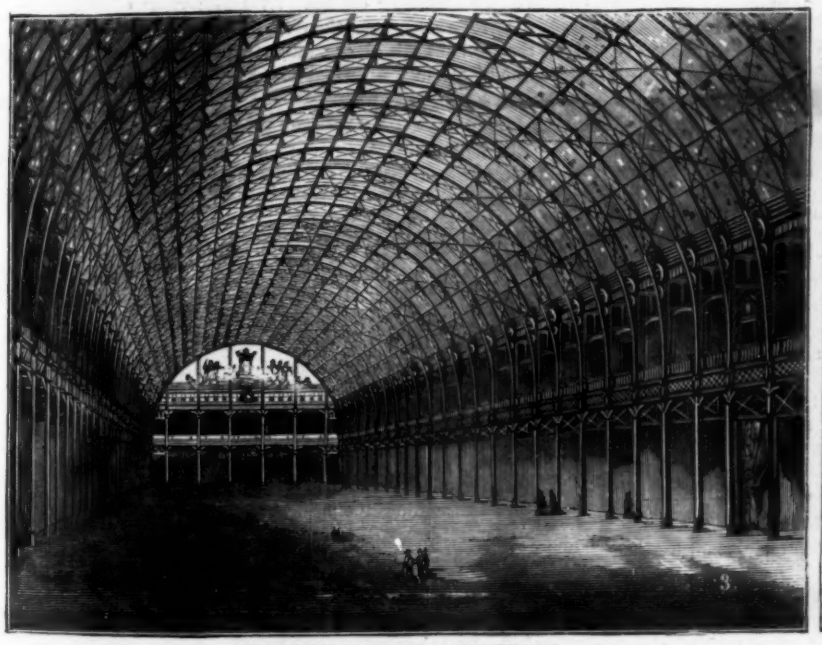
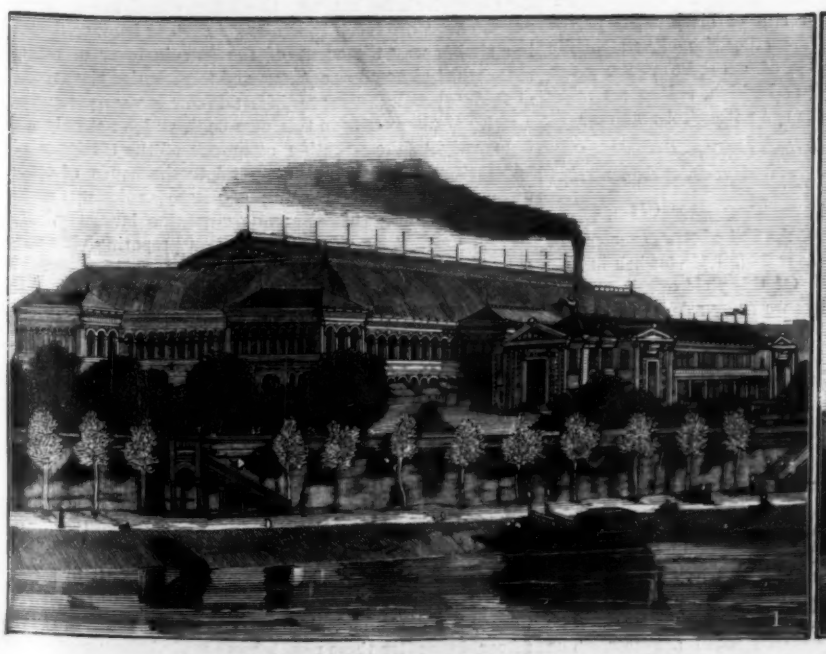


INTERIOR BEFORE EXHIBITION.

INTERIOR WITH EXHIBITS PLACED.



THE PALACE OF INDUSTRY.—RIVER SEINE FACADE.

THE PALACE OF INDUSTRY.—CHAMPS-ELYSEES FACADE.

THE INTERNATIONAL ELECTRICAL EXHIBITION OF 1881 AT PARIS.—THE EXHIBITION BUILDINGS.

Scientific American.

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NEW YORK, SATURDAY, SEPTEMBER 17, 1881.

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(Illustrated articles are marked with an asterisk.)

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THE SCIENTIFIC AMERICAN SUPPLEMENT,

No. 298,

For the Week ending September 17, 1881.

Price 10 cents. For sale by all newsdealers.

A STUDY OF CHILDREN'S TEETH.

For two or three years Dr. Samuel Sexton has been engaged in an investigation of the teeth of school children with special reference to the influence of decayed teeth upon the sight and hearing of children so afflicted. The investigation was suggested by the almost constant occurrence of defective teeth in cases of inflammatory diseases of the eye and ear.

In the course of his work, the *Times* states, Dr. Sexton has taken some hundreds of accurate casts in plaster of the interior of the mouth in cases that have come under his notice, and has collected a cabinet that is invaluable as a contribution to science. His method has been, first, to take a complete cast of the internal cavity, and then from it to mould each jaw separately, and unite the two posteriorly with a neat brass hinge, so that the state of the teeth, their arrangement, and all their peculiarities can be observed at a glance. He has found a pretty constant association between myopia, impaired hearing, and defective teeth, the cause of which he believes to lie in the distribution of the fifth pair of nerves, which is at once a sensory, motor, and trophic pair, supplying the teeth, the tissues of the nose, those of the eye and ear, the integuments of the frontal and temporal region, and so on. Irritation of the whole region is consequently produced by a defective tooth, and, in point of fact, some of the severest cases of neuralgia, temporal, facial, and ophthalmic, arise from impaired teeth; often in cases where the teeth themselves give no trouble whatever, and none save the acutest medical intelligence can trace any relation between the fierce attacks in the eye, ear, or temple, perhaps, and the caried tooth that gives no local trouble whatever. In a few cases progressive dementia has been arrested by immediate repair of a tooth that produced no apparent disturbance, but was responsible for deep-seated cerebral trouble; but these cases have been too few to lay stress upon them as factors in the investigation. On the other hand, troubles with the eye and ear are often traceable to defective teeth, and Dr. Sexton regards irritation of the maxillary limbs of the fifth pair as among the principal causes of the progressive nearsightedness of school children, as observed by Drs. Agnew, Loring, Parke Lewis, Kohn, and other ophthalmologists.

THE WORLD'S FAIR PROJECT.

The talk of a world's fair in Boston seems to have come to nothing more speedily than the same project did in this city. Curiously the matter is again proposed here, and it is said that the originators of the new movement are men whose business standing is such as to justify a considerable degree of hopefulness touching the final execution of their plans. If they have no old buildings to sell, no real estate speculations to further, and are considering a world's fair for itself and the advantages which a properly conducted international exhibition would bring to the commercial and industrial interests of the metropolis, it is possible for them to make a success of it. As the greatest manufacturing center in the world, the chief commercial port of a hemisphere, and soon to be the financial center of the world's trade and enterprise, New York presents a site for an international exhibition of progress in the arts and sciences unequaled in capacity and attractiveness. But it will require men of large means and larger ideas to develop its possibilities so as to do full justice to the city and the occasion. No others can awaken the public interest or command the respect requisite for success.

A NEW DICHROIC THERMOMETER.

A thermometer of a novel and somewhat sensational nature is being introduced in England by Mr. Sharland, the patentee of the same. Instead of filling the tube with mercury or alcohol, colored red as usual, this is filled with alcohol containing some dichroic compound of a pale yellow color, when looked through, but green when looked upon The result is that, by aid of a slip of black paper pasted along the back of the tube, the otherwise clear alcoholic column assumes the appearance of a bright opaque green emulsion on a black ground, and which, unlike a similar column of mercury, catches the eye with great readiness.

THE MANUFACTURE OF SALT IN THE UNITED STATES.

The preliminary report of Special Census Agent W. L. Rowland on the salt industry of the United States shows that the salt product has increased from 12,717,198 bushels in 1860 to 29,800,298 bushels in 1880. Of this yield of salt, 888,968 bushels came from sea or bay water by solar evaporation, and 944,158 bushels from inland lakes or natural deposits by the same process. The amounts produced by artificial heat from subterranean brines were 8,853,821 bushels by kettle or pan process, and 16,115,351 bushels by steam evaporation process.

Fifteen States and Territories have salt works: namely, California, Florida, Kansas, Kentucky, Louisiana, Massachusetts, Michigan, Nevada, New York, Ohio, Pennsylvania, Texas, Utah, Virginia, and West Virginia. Michigan leads, with 12,425,885 bushels; New York produced 8,748,203 bushels; West Virginia, 2,679,438; Ohio, 2,650,301; California, 884,443; Pennsylvania, 851,450; Utah, 483,800; Virginia, 425,895; Louisiana, 312,000; Nevada, 182,408. The other States named produced only small amounts. The total value of the salt product of the entire country during the census year was $4,817,636. In California, Florida, and Massachusetts salt is made from sea water; in Louisiana rock salt is mined and ground.

The salt industry employed capital to the amount of $8,225,740, and over 5,000 hands, whose wages amounted to $1,256,113. The wells number 539. The deepest wells are in West Virginia, where they average 1,043 feet. The Ohio wells average 902 feet; Pennsylvania, 884 feet; Michigan, 881 feet; Kentucky, 560 feet; New York, 324 feet; Virginia, 262 feet. The rest are shallow.

THE ANTHRACITE INDUSTRY.

The preliminary report of Special Census Agent Raphael Pumpelly on the production of anthracite coal gives the following facts and figures:

The anthracite mines are confined to eight counties in Pennsylvania, in which there are 273 collieries, having an average yearly capacity of 149,348 tons of 2,000 pounds. The average product for the census year was 100,488 tons. The maximum yearly capacity of all the collieries reported is 40,772,000 tons. The actual output was about 28,000,000 tons. The total number of employes was 68,239, of whom 19,585 were miners, 47,410 were laborers, and 1,244 were of the administrative force—foremen, engineers, superintendents, etc. The number of men employed above ground was 15,564; boys, 11,921. The number of men and boys employed below ground was 35,952 men and 3,802 boys. The total wages paid, $21,680,120. Nearly 10,000,000 of "culm," or impure coal and dust, were raised during the year.

The consumption of material included 30,405,658 linear feet of unsawed lumber, worth $830,743; 39,605,517 feet of sawed lumber (board measure), worth $644,109; explosives to the value of $1,550,680. The number of acres of coal lands reported was 164,852, valued at $102,614,844. There were employed in anthracite mining 409 horses, 7,718 mules, and 1,604 steam engines, worth respectively $48,862, $848,665, and $3,708,366. Other statistics run as follows: Horse power of engines, 102,522; number of boilers, 4,007; value of boilers, $2,332,640; horse power of boilers, 86,408; mine locomotives, 80—value $243,258; number of pit cars, 30,384—value, $163,560; miles of railroad track underground, 1,085; miles of track outside, 258. Total value of machinery, including engines and boilers, $13,295,415; value of plant (machinery, tracks, cars, animals, shafts, etc.), $39,814,399; value of working capital, $7,731,953; value of real estate, $159,161,196. More than 4,000,000,000 tons of anthracite remain to be mined, or enough to last 146 years at the present rate of mining.

THE ATTENUATION OF VIRUS.

So long as vaccination stood alone, the alleged prevention of a malignant disease by the voluntary production of a mild disease of a similar type being a fact unique and unexplained, the anti-vaccinationists had a shadowy ground to stand on. How is it possible, they asked, to protect life and health by inviting disease? And when they boldly disputed statistics and pronounced the theory of vaccination a delusion, not a few intelligent people were confounded and prejudiced against a practice which has reduced to comparative feebleness one of the worst of the plagues of former days.

The discoveries made last year by Professor Pasteur in connection with chicken cholera, and fully described in this paper at the time, made vaccination a fact no longer unique, and gave a most promising clew to the rationale of its operation in making the system less vulnerable to smallpox. As our readers will recall, that distinguished investigator of microscopic life demonstrated the living virus of chicken cholera, and proved that by suitable cultivation it could be so attenuated or shorn of its malignant quality that it would produce only a feeble disturbance of the animal organization, which yet sufficed to protect the animal as thoroughly from the more virulent disease as the latter could in case it was not fatal. More recently Professor Pasteur has investigated in a similar way the virus of the splenic fever of cattle, more widely known as anthrax and the Siberian plague; and at the late medical congress in London he gave an account of a series of discoveries in this new field, which not only add immensely to the scientific assurance of the efficiency of vaccination among men, but put into the hands of cattle owners the means of arresting a disease as destructive to domestic animals as smallpox ever was to humanity. He also demonstrates a general method of preparing virus vaccine, based on the attenuating action of oxygen and the air, which makes it probable that a virus can be prepared which, while it thoroughly protects against smallpox, will be less open to objection than humanized or even bovine virus, since the possibility of conveying at the same time any syphilitic or septic taint will be entirely obviated.

Already these investigations have resulted in the attenuation of four kinds of virus, bringing under control as many types of malignant disease.

As a proof of the protective efficiency of the attenuated virus, Professor Pasteur described the following experiment. He took fifty sheep and vaccinated twenty-five of them. A fortnight after all of the fifty were inoculated with the most virulent anthracoid microbe. The twenty-five vaccinated sheep resisted the infection; the unvaccinated twenty-five died of splenic fever within fifty hours. Within fifteen days after these results were made known more than 20,000 sheep and a large number of cattle and horses were vaccinated in and around Paris.

EARLY AMERICAN CONTRIBUTIONS TO TEXTILE FINISHING MACHINERY.

The records of the Patent Office for its first quarter century show that during the earlier years of American independence the attention of our inventors was very largely directed to the origination and improvement of textile machinery. This was natural, since the rude domestic appliances for cloth making which had been handed down from almost prehistoric times required for their use an abundance of domestic help not found in the new country.

England's commercial development had made a fair beginning, and the demand for woven goods by her adventurous shipmasters in foreign trade had called into existence the beginnings of the great factories which subsequently won for England a large part of her industrial supremacy. Steam machinery was becoming an important industrial factor in such establishments, and their owners were competing for labor-saving processes and appliances. The origin of many of these has hitherto remained untraced, the presumption being that they were of English invention. Doubtless most of them were; yet when a more critical study of the history of a single branch of textile operations is made it is surprising to see how largely the mother country was indebted to American inventors for the means of her industrial success. It is hardly possible that the branch of manufacture referred to was entirely exceptional in its history.

During the past fifteen or sixteen years Dr. Hermann Grothe, of Berlin, the highest European authority on textile technology, has been making an elaborate and minute study of the history of machinery for finishing cloth and other woven fabrics; and, in a communication to the National Association of Wool Manufacturers (*Bulletin*, Nos. I. and II., 1881), he sets forth a large number of interesting discoveries touching the contribution of early American inventors to this branch of the art. The idea has generally prevailed that all the inventions of textile machinery until the beginning of this century were made in England; but on examining the letters patent and specifications of England since 1616 he finds that many of the inventions were only imitations and improvements. To trace their origin he has examined the literature of technology and many old pamphlets and journals, finding "repeated proofs that American finishing machinery had been exported to England and France, and essentially contributed to establishing in those countries the industry of the construction of this class of machinery. This," Dr. Grothe adds, "is prominently the case with machinery for fulling, gigging, and shearing cloth."

We have gone over the evidence cited by Dr. Grothe with considerable care, and have been able to verify most of his references, except for dates earlier than 1793, the beginning of the United States patent record. It would be an interesting task to examine the lists of British patents before the American Revolution to discover what contributions were made from the colonies. The invention of Walter Burt (1774) must have been of that number, and possibly also that of John Dyer, whose name does not appear in the records of the United States Patent Office. The date of his patent as given (1833) must be wrong; perhaps 1733 was the date intended. Another obvious slip in that part of Dr. Grothe's communication printed below is corrected, and a number of details elsewhere added in brackets. The name "Ellis Jonathan" does not appear in the American record. Mr. Jonathan Ellis, who took out a patent in 1807, is probably the person meant. Dr. Grothe says:

"The fulling mill with rollers is completely an American invention, namely, that of John Dyer (patented 1833), and was introduced by Hall, Powell, and Scott from Boston to Rouen, France, as the brevets and bulletins of France fully establish. The invention of the double crank-shaft fulling mill was made by Levi Osborn in America [Fairfield, Conn.] in 1804, commencing a great series of constructions on the same principle. The first idea of a gigging mill is contained in James Delabarde's patent, No. 237, in England, and several inventions were made by others; but all these constructions have only imitated the operation of gigging by hand. In 1774 Walter Burt had obtained in America a patent for a gigging mill, and after his time the gigging mills with a rotating barrel became common in England with improvements of Lewis, Price, and others. All these English machines were patented after the gigging mills in America of Jerseys, Christie [Joseph A., Elizabeth, N. J., 1816], Olney [Joseph, Westmoreland, N. Y., 1813–1817], Barrows, Beck, Wells, and others had appeared.

"Very important, I find, is the portion of merit which I must concede to American inventors. The merit of the invention of the cylinder shearing machine belongs to Samuel Griswold Dorr [Albany, N. Y.], (patented October 20, 1792). He named his machine the 'wheel of knives,' which are arranged radially and parallel to the axis of the cylinder, and around it; but the construction of 1793 contains the knives radially and *spirally* arranged around the cylinder. The constructors, Price, Lewis, and Davis, of England, have imitated this construction, and with much merit improved it, after 1815. It will be observed that the English inventors from 1792 to 1815 had taken out many patents for shearing machines; but all of them followed the construction of the old hand-shears, or the old shearing machine of Harmer, containing a series of hand shears. In 1806 and 1810 Beriah Swift, of Washington, had obtained patents for a shearing machine with an oscillating cylinder. This invention appeared in England as that of one Miles, and was patented in the name of the latter; but Miles was only the agent of Swift. A document relating to 'the importation of American shearing machines with spiral knives,' contained in the testimony of a Mr. Rathgate in Galashiels in 1823, shows that such shearing machines were built in England at that time as had been imported from America ten years before. Mr. Alcan has also shown that a Mr. Ellis Jonathan, in 1812, had received a patent in France for a cylinder shearing machine which George Bass had exported to France from Boston. This was a longitudinal shearing machine with a spiral cylinder. That much attention was given in America to the improvement of shearing machines is demonstrated by the list of patents from 1792 to 1817. At this latter date all the improvements then known in these machines had been completed in America, and after that time commenced the construction of the improved machines in Europe. The fact is interesting that Edmund Durrin, of Weathersfield, N. Y. [Vermont], in 1814, invented a shearing machine with two saw blades, one of which was fast, and the other moved with great celerity over the fast blade. This machine was patented in Europe in 1823, under the name of John Bainbridge.

"The invention of the pressing machine with steam belongs to Seth Hart [Hempstead, N. Y.], who received a patent in America in 1812. This invention appears in 1824 in Europe, John Jones taking out a patent for the same in England. It appears that John Beverley, an owner of woolen and cotton factories in America, made the first use of the hydraulic press in 1803 [patented December 26, 1803]. He named his construction a 'hydro-mechanical press.' Bowker & Hall, of Boston, constructed, in 1814, a rotating cylinder press, heated by steam. This press is believed to have contained the first idea of the steam cylinder cloth-press, now so much in use."

The volume which Dr. Grothe is at work upon will no doubt clear up many doubtful points in the history of cloth finishing machinery, and Americans will rejoice with him in his ability "to award the merit of priority in invention claimed for England to America, the country which has created inventors through her system of home industry and personal liberty"—aided, Dr. Grothe should have added, by an official disposition to deal justly with inventors.

TURKEY RED ON COTTON.

The following will serve as an answer to those who have inquired how to dye fast or Turkey red on cotton:

There are several processes by which this desirable color is produced; of these the following is considered one of the best:

The goods are first steeped in soft water for about forty-eight hours to remove the sizing. A small quantity of malt liquor is usually added to this water to render the starch soluble—by transforming it into dextrine and glucose.

The material is next boiled for half an hour or more in an aqueous solution of carbonate of soda, specific gravity 1·01, wrung out, and oiled, by padding, in a mixture of rancid oil and a very weak lye. For one hundred pounds of goods:

Gallpoli oil	58 pounds.
Water	15 gallons.
Carbonate of soda	½ pound.
Carbonate of potassa	½ "

When well oiled the cloth is hung up in the air until it feels dry, then hung up in a stove room heated to about 140°, where it is allowed to remain for about twelve hours. These oiling or padding and drying operations are usually repeated two or three times, according to the intensity of color required.

In the next operation the cloth is steeped for twenty-four hours in a cold emulsion composed of oil, carbonate of soda, and water:

Water	10 gallons.
Carbonate of soda	5 pounds.
Oil	50 "

This having been pressed out, the pieces are carefully rinsed in water, and passed slowly and repeatedly through the following solution, which is kept at a temperature of 150° Fah.:

Water	30 gallons.
Ground gall nuts (or sumac)	10 pounds.
Alum	16 "

They are then hung up for forty-eight hours in the stove room, kept at a temperature of 140° Fah.

Next follows the chalk bath—composed of about ten pounds of floured chalk in fifty gallons of water heated to about 180° Fah. Through this the pieces are passed, and, after rinsing out, are ready for the dye beck.

The dyestuffs allowed for each piece in the beck are,

Madder	17 to 20 pounds,
Garancin	3 to 5 "

dissolved in about 300 gallons of water. Alizarine is now extensively used as a substitute for the above dyes.

When the goods are put into the beck steam is let in and the temperature gradually elevated during one and one half hours to 180° Fah.; then rapidly to near the boiling point, where it is maintained for about an hour. At the expiration of this time the pieces are wrung out, passed through a washing machine, then through the chalk bath, rinsed, returned for a short time to the dye beck, and finally washed out.

The red color thus obtained is dull and dark, and to brighten it properly requires three cleaning operations. These (or the first two) are performed in close boilers about two-thirds filled with water. In the first of these soap and carbonate of potassium are dissolved:

Soap	6 pounds,
Carbonate of potassa	1½ "

and the dyed goods are boiled therein by steam for about eight hours. After rinsing, the pieces are boiled in the second boiler, containing, dissolved in the water,

Soap	6 pounds.
Chloride of tin	7 ounces.

After rinsing this boiling is usually repeated. Finally, the pieces are exposed for several hours to the atmosphere, then passed through a hot bran bath, and dried. The result is the peculiar deep, rich, and fast red so much prized.

It is well to remark here, for the benefit of those not skilled in the dyer's art, that success in the production of this color on cotton goods depends much upon the attention paid to matters of detail in carrying out the numerous operations, and it is common experience that at first good results are obtained only after repeated trials.

THE GOURAMI.

A live gourami was recently received by Mr. E. G. Blackford from M. Carbonnier, of Paris. Two specimens were sent, but unfortunately the female died shortly before the ship arrived at this port. The other, the male, arrived safely, the first live gourami brought into the country. The readers of the SCIENTIFIC AMERICAN will recall the handsome illustration of this fish which appeared in this paper last winter (December 4), with the suggestion that it would be a good subject for introduction into our Southern rivers. It is said that Colonel Pike, formerly American Consul at Mauritius, was the first to draw the attention of the ichthyologists in the Smithsonian Institution to the gourami, having forwarded several preserved specimens. The original geographical range of this fish, the *Osphromenus goramy*, is in the waters of Cochin China. It is also found in Java, Sumatra, and in Penang. It was introduced into the waters of the Mauritius and Reunion with success, but attempts to rear the fish in Martinique and Cayenne have not given satisfactory results. M. Carbonnier writes that the temperature necessary for the fish is from 20° to 25° centigrade. Other authorities place it higher, from 24° to 26° centigrade, which is about from 75° to 78° Fahrenheit. It would be, therefore, impossible to raise the gourami in waters adjacent to New York City, though there might be no great difficulty in placing them in the streams of Florida and Louisiana. There has probably been some exaggerations as to the size of the gourami, which is reported to have been found weighing 110 pounds. In the Island of Bourbon they have been caught weighing from 22 to 35 pounds, but this large size seems exceptional. The flesh is considered excellent, and is of a yellow straw color. Its growth is fairly rapid under advantageous circumstances, and in the third year it attains the size of a foot. It is omnivorous, taking flesh and vegetables, and on this account has been called by the French colonists the *porc des rivières*, or water pig. One peculiarity of the gourami is that it builds a nest of weeds, in which it deposits its eggs, from 800 to 1,000, and it cares for the young fish. This fact of philoprogenitiveness would probably aid very much in rearing the gourami in our warmer Southern waters.

The specimen received has been turned over to the Smithsonian Institution; and it is expected that others will be sent over by M. Carbonnier, whose efforts to introduce the fish into French waters have become historic.

The Ferries of New York Harbor.

The statistics of the ferries which ply between New York and the towns and cities adjacent carry in the course of a year upward of 100,000,000 passengers. The proportion carried daily on the different lines is given as below:

Ferries.	Passengers.	Ferries.	Passengers.
Fulton	72,000	10th Street	2,500
Hamilton Avenue	33,000	23d Street	3,000
South	19,000	34th Street	6,000
Catharine	22,000	Liberty Street	21,000
Wall Street	20,000	Cortlandt Street	18,000
James Slip	3,000	Barclay Street	5,000
Division Avenue	4,000	Desbrosses Street	7,000
Grand Street	6,000	Christopher Street	8,000
Staten Island—		23d Street	4,000
North Shore	10,000	Weehawken	1,500
South Shore	7,000	Astoria	500

Fulton Ferry employs five boats, which run every six minutes during the day and evening, and every fifteen minutes after one A.M. until five in the morning, only two boats, however, being employed in the latter trips. Each of these boats frequently carries during the crowded hours 2,000 passengers.

Hamilton Ferry employs three boats, which run every ten minutes during the day, and half hourly after ten o'clock at night. South Ferry employs two boats, whose time of running is the same as on the Hamilton Ferry. Wall Street Ferry has two boats, which run at ten minutes' interval from six A.M. until twenty minutes past eight, after which there is a boat every twenty minutes until eleven P.M., and thereafter no boat until morning.

The other East River ferries employ from two to three boats each, running at frequent intervals, except Astoria Ferry, which is half-hourly during the day.

On the North River, first in order are the Staten Island ferries, the boats being little less than large steamboats, and at one hour and half hour intervals.

The ferry at the foot of Liberty street employs five boats night and day; the Cortlandt Street Ferry has three boats, and that at Barclay street four. Pavonia Ferry has two boats; Desbrosses Street Ferry, three; Twenty-third Street Ferry, two; Christopher Street, two; Weehawken Ferry, two.

IMPROVEMENT IN SCHOOL DESKS.

No article of furniture is subjected to harder usage than the school desk; and the inevitable wear and rack and strain that tend to destroy it can be resisted only by improved construction and increased strength.

The manufacture of this class of furniture requires no little skill and inventive genius, the conditions of use being such as to require the utmost care in workmanship as well as in design and in the selection of materials.

The desk shown in perspective and in detail in our engravings embodies several important improvements, which strengthen it and render it stable and durable. In design it is as shapely as anything adapted to the purpose can be. The joints of the woodwork are of a new form, being double tongued and glued, making a very handsome and strong joint.

The fastenings of the iron in the wood are a novelty, and insure strong and perfect work without the use of screws.

Fig. 1 represents the improved method of uniting the slats of the backs and seats by double tongue and groove glue joints. Both joints act to hold the slats from warping, springing, or twisting out of shape, producing open joints and uneven rough surfaces; in fact, the backs and seats are stronger and better than if made of a single piece, and have the requisite curves and beautiful appearance produced by the alternate slats of different colored woods. Fig. 2 shows the dovetail groove across the back and bottom of the desk, with a portion of a standard shown wedged into the back. These backs and bottoms are finished as a single piece, by machinery, on both sides, with the edges, ends, and corners nicely rounded, making a smooth, solid, substantial finish. The expanding dovetail desk can be set up in one-third the time required to put up the ordinary loose slat desk, and is much more smooth, solid, and durable.

The iron wedge-expanding dovetail fastening of the desk is shown in Figs. 3 and 4. The wedge at the right is shown slipped into the inclined key way, ready to be driven forward with hammer and punch. The wedge at the left is shown driven home under a lip on the casting, with the flange on the wedge overlapping the edge of the groove, thus locking all securely together. The wedges are provided with barbs that sink into the wood, and prevent their withdrawal without the use of hammer and punch.

Fig. 4 is an end view showing the dovetail fastening expanded, completely filling the groove, and Fig. 5 is a view of the seat hinge with the seat folded up.

The so-called "Paragon" school desk is manufactured by the Buffalo Hardware Company, Buffalo, N. Y.

IMPROVED SCHOOL DESK.

Fig. 1.

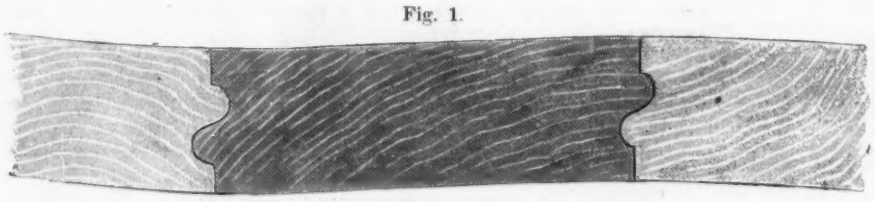


Fig. 2.

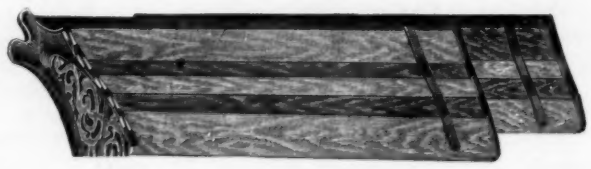


Fig. 4.

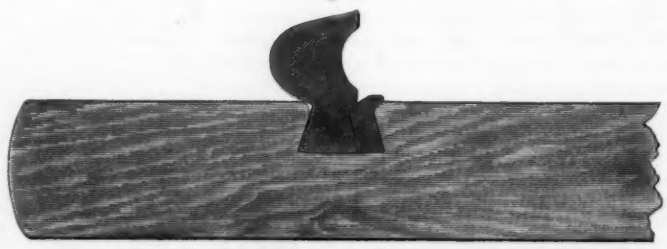
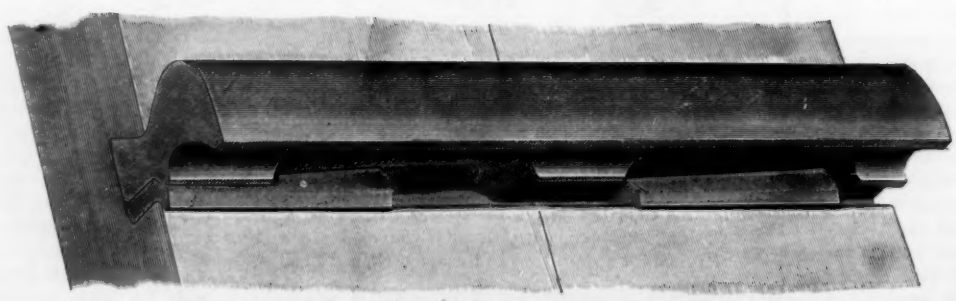


Fig. 5.

Fig. 3.



DETAILS OF IMPROVED SCHOOL DESK.

Tortoise-shell Glass.

An invention for producing in glass an imitation of tortoise shell has lately been perfected by Herr Francis Pohl, a German chemist, in conjunction with S. A. Wittmann, a London glass merchant.

In carrying out the said invention, a bulb is blown of a dark brown glass, and another of a light brown glass, and the said bulbs are broken into fragments of various sizes, or several bulbs of different shades of brown are blown and broken into fragments. A bulb of plain glass is then blown, and the upper part is cut off from the lower part, which adheres to the blowpipe. While the plain glass bulb is being blown, a second blower blows another bulb of plain glass, and dips it in and rolls it among the fragments of brown glass aforesaid, which are thereby made to adhere to the said bulb. The bulb with the fragments adhering thereto is then inserted in the cut-off portion of the first-named plain glass bulb, and the two are then blown together. The whole is next rewarmed, and swung and drawn out as one bulb, and treated in the manner ordinarily practiced in preparing glass for the manufacture therefrom of vessels and other articles.

When the fashioning of the vessels or articles is completed they are coated or painted with a solution of chloride of silver and yellow ocher, or with other suitable materials for producing a yellow stain, and afterwards fired.

Blasting without Drilling.

Experiments have been recently carried out by Major Lauer, of the Austrian Engineers, at Krems, on the Danube, to show the value of his new method of blasting rocks under water. The chief feature of Lauer's system is to employ a hollow cylinder, like a gas pipe, and to place the dynamite cartridge, not as hitherto in a hole bored into the rock to be blasted, but in the cylinder in question. The cartridge only touches the surface of the rock which it is desired to shatter. The explosion of the dynamite is effected by means of electricity, and the effect is said to be greater than with the usual cartridge in a hole bored in the rock. The rock is shattered into fragments so small that a fair stream is able to wash them away without help, whereas in the case of gunpowder the rock is only split up into blocks more or less large and troublesome to remove. The Lauer system is calculated to effect a saving of fully 40 per cent as compared with the old system.

NEW INVENTIONS.

An improved flood fence has been patented by Mr. Thomas C. Nichols, of Princeton, Ind. This invention consists of a fence pivoted at its lower end to stationary posts, and adapted to be revolved so as to rest on the ground or to be revolved into a vertical position, and provided with an upper wire serving as a latch for a catch or catches on the stationary posts.

Mr. William M. Turner, of Albia, Iowa, has patented an improved milk cooler designed to raise cream on the milk on the cream-gathering plan, so as to allow the farmers to set their own milk to be skimmed by the manufacturers of butter. It consists in a can having an upper and lower flanged cover and three vertical tubes, one of which leads from the tray formed by the flange on the top side of the cover, and conveys the cold water to the middle tube, which is larger, and which rises in the center of the can to nearly the top of the same, and from the top of which the water passes into another tube on the opposite side from the first, to the bottom of the can, at which point the water emerges and surrounds the whole body of the can to height of milk, and passes off through an overflow orifice in a surrounding tank, in which the can is partially submerged, by which means a positive circulation and thorough cooling effect are produced.

An improved dental articulator has been patented by Mr. Henry L. Cruttenden, of Northfield, Minn. The object of this invention is to facilitate ascertaining the exact articulation of the jaws, for enabling exact and accurate setting and fitting of sets of artificial teeth.

An improved rotary shelf for ovens has been patented by Messrs. Addison M. Youngs and Josiah Smith, of Sag Harbor, N. Y. The object of this invention is to facilitate the insertion into stove and range ovens, and the removal therefrom, of articles to be baked, and also the convenient adjustment of the articles while in the oven.

An improved animal power has been patented by Mr. Nicholas Potter, of Troy, Pa. The object of this invention is to improve the construction of the animal powers for which Letters Patent No. 112,179 were issued to the same inventor February 28, 1871.

Mr. Jeremiah C. Jones, of Whitt, Texas, has patented an improved stock car for transporting cattle and horses on railways; the object of the invention is to provide means for allowing the animals occasional opportunities to lie down and rest and be fed and watered.

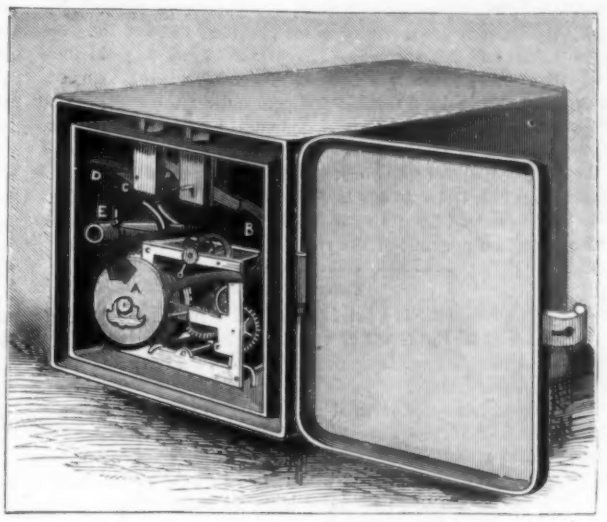
In the usual process of manufacturing glue the stock is first soaked by placing in vats containing lime water, then carried to the wash mill, where it is washed, and then carried to the boilers and boiled until the valuable portions are extracted, when the water is drawn off for subsequent evaporation and drying of the glue and the refuse removed from the mill. Large quantities of stock are worked at once, and the labor of handling the stock is severe and prolonged, on account of the weight of the materials and the frequent changes that are required more or less frequently, according to the condition of the stock under treatment. Messrs. Henry H. Baeder, of Cincinnati, O., and William A. Baeder, of Brooklyn, N. Y., have patented an improved apparatus which facilitates these operations and reduces the labor required in handling the glue stock; and the invention consists in a wheeled tank or case for use in the soaking vat and for transfer of the stock to the mill, and in a combined washing and boiling vat.

An improved jointed pitch board for squares has been patented by Frederick N. Marvick, of Palatka, Fla. The invention consists in a carpenter's square provided with a middle jointed rule slotted in both sections, and connected by a clamp bolt and nut with the slotted arms of the square.

THE FENIAN INFERNAL MACHINES.

In a recent number of the London *Graphic* we find the following engraving of one of the infernal machines lately captured at Liverpool, England, by the customs authorities there, on board of a vessel from Boston. It appears from this that these machines were manufactured in this country and sent over to England for nefarious purposes.

The machine consists of two cases, with a space between in which the explosive is to be placed, the outer case of zinc, the inner of brass, which contains an ordinary cheap clockwork, made by the Ansonia Clock Company. A is a brass disk driven by a mainspring; B, a lever bearing on the edge of A. Lever B communicates with a trigger, C, which, when the notch in disk, A, has, by the rotation of the disk, allowed the lever, B, to fall, liberates a powerful spring hammer, D, which falls upon a cap on a nipple, E, and fires a fuse which leads to the explosive that is arranged between the cases, and explodes the same. The box is six inches square at the ends and twelve inches long. It forms a very deadly implement by which the lives of hundreds of innocent people might be sacrificed in an instant, without chance for detection of the cowardly author.



One of the Infernal Machines recently found on board ship at Liverpool.

That must be a wretched cause, indeed, which can inspire its agents with no higher or nobler ingenuity than to make and skulk about with such devilish contrivances.

The following extract from recent proceedings in Parliament will perhaps give a better idea of the construction and object of these machines, and of the feelings produced by their discovery in England:

LORD SANDON.—I wish to ask the right hon. gentleman, the Secretary of State for the Home Department, whether he can give to the House any information as to the reports contained in the morning papers of Monday, with reference to the discovery in Liverpool of a number of explosive machines on board two vessels which have arrived from America; and further, whether he has any information that such machines were sent by any persons connected with Fenian conspiracies.

SIR W. HARCOURT.—The accounts which have appeared in the morning papers relating to the explosive machines seized at Liverpool are substantially correct. The Government have not hitherto been desirous of giving publicity to the matter—first, because the knowledge of the facts might have proved an obstacle to the detection of the offenders; and, secondly, from a natural desire not to create alarm. But secrecy in these days has ceased to exist, and now that the circumstance is generally known, it is right that the facts should be authoritatively stated. More than three weeks ago the Government received information of the consignment to Liverpool, and then on their way from America, of a number of infernal machines concealed in barrels of cement. I accordingly communicated at once with the Commissioners of Customs, and a confidential agent of the customs and a metropolitan police officer were dispatched from London to Liverpool to await the arrival of vessels which had been designated. These officers reached Liverpool only a few hours before the arrival of the first of the vessels. The cargoes were accordingly searched in concert with the police and the customs authorities at Liverpool, and in the first vessel six of these machines were discovered in a barrel said to contain cement; and four more were found in the second vessel, concealed in the same manner. The machines consist of a metal box divided into two compartments, the upper portion containing a six-hour clock work movement so arranged as to ignite a detonator to be hereafter inserted, which was to communicate with the lower compartment containing eleven cartridges, each charged with three ounces of a nitro-lignine compound which resembled, but which has proved not to be, dynamite. It is, however, of a highly dangerous character—of the character of gun cotton. I have had the material carefully examined and experimented upon at Woolwich. Each of the ten boxes contained a charge of over two pounds of explosive, and one of the barrels contained in all nearly a stone weight of this nitro-lignine compound. It is impossible to estimate the fatal effects of even an accidental concussion on such a material. I need not say that Her Majesty's Government have employed and are employing every resource at their disposal to detect the consignees in England and the consignors in America of these machines. The actual history of the dispatch of these machines is under investigation in America and remains to be ascertained. But on the face of them they appear to be the precise and literal fulfillment of projects openly avowed and declared in the Irish Fenian press of America. Week by week, for the last nine months, open threats and public invitations to general outrage and private assassination have been circulated, and subscriptions for these purposes have been openly collected in the United States and actually expended for these purposes. More than one attempt of the kind has been made in England by miscreants hired and dispatched from America for this purpose, and their work has been publicly claimed by their instigators as a reward of past and a motive for fresh subscriptions. I thought it my duty at an early period of this session, in the debates on the Arms Bill, to call the attention of this House to these publications, their avowed object, and their necessary results. Some silly and inconsiderable people—to use a mild term—made light of these atrocious teachings, and disparaged all attempts to restrain or punish these incitements to crime. But Her Majesty's Government have not regarded them as things to be laughed at or neglected. They knew well the gravity of the case, and have not been the dupes of the mischievous fallacies of their apologists. The principal origin of these attempts is to be found in the assassination press. (Cheers.) This poisonous seed, sown broadcast, finds a congenial soil in evil minds, and bears a fatal fruit. (Hear, hear.) We have shown in the prosecution of the *Freiheit* that the law of England is capable and ready to deal with such criminals not less in the interests of our own people than of foreign states. (Cheers.) In my opinion, it is the duty of every civilized government to co-operate in putting down with a strong hand these nefarious enterprises. I have seen with regret the attempt on the part of persons in this country who ought to know better (Hear, hear) to weaken the hands of the Government in the representations they have thought it their duty to make to the Government of the United States on these matters. It is my firm belief that the Government of the United States is as ready as our own to repress and to punish the authors of such crimes. (Cheers.) It is their interest no less than ours, for the danger is as great to every American citizen as to every British subject who crosses the Atlantic. But in any event I can assure the House that Her Majesty's Government are and have long been fully alive to their responsibility in this matter—a responsibility which the House will believe is sometimes heavy enough to bear. And the Government confidently count on the support of Parliament and the country while they employ every power of the Executive and every engine of the law to detect and to destroy these associations of assassins. (Cheers.)

FERGUSON & KEMPE'S AUTOMATIC REGISTERING STAMP.

The registration of the number of letters or circulars which are sent out from an office or house of business is often required; hitherto no means other than that of actually counting has been devised for the purpose. Messrs. H. Ferguson and H. R. Kempe have recently invented and patented a simple apparatus for automatically effecting the registration either electrically or mechanically.

When letters pass through an office they are impressed with stamps for obliterating, dating, and other purposes by means either of a hand or a lever stamp. Messrs. Ferguson and Kempe take advantage of this fact, and mount either the pad for inking the stamp, or the pad on which the letter is placed to receive the stamp, on spring supports, and provide electrical contacts, so arranged, that when the pad receives the pressure of the stamp, a current of electricity is transmitted to an electrical counter, which is thereby moved one division. When the stamp is worked by a lever the contacts are arranged to be operated by the movement of the lever, the pads in that case not requiring the elastic supports above referred to. In cases where it is inconvenient to employ electricity for conveying the counting movement, the counter is constructed in combination with the hand stamp itself, and is worked mechanically in the following manner: The stamp is fitted so that it can slide a little longitudinally in its handle, pressing it forward by a spring. Within the upper end of the handle is placed a small mechanical counter, the pawl which works its ratchet being connected to the sliding stamp, so that every time the stamp makes an impression the counter ratchet is moved one tooth. As for each act of stamping it is usual to subject the stamp to two pressures, one on the inking pad and one on the letter, the ratchet wheel of the counter is made with double the usual number of teeth, so that two successive impulses move the counter only over one division.

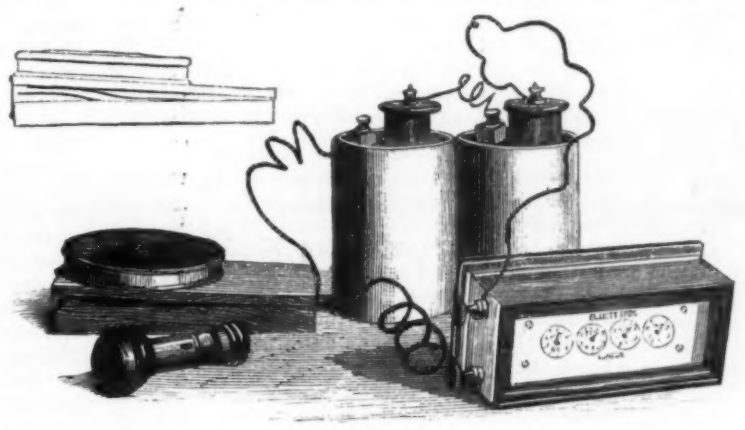


FIG. 1.

FERGUSON & KEMPE'S AUTOMATIC REGISTERING STAMP.

Fig. 1 represents an arrangement of inking pad working in electrical connection with a counter. The pad is mounted on a hinged board, which is pressed upward by a spring against a stop. When the pad is pressed down by the act of inking a stamp, the upper spring is brought in contact with a lower spring. These two springs (seen in the small figure), which are fixed on a base of wood, are connected by conducting wires through a battery with an electrical counter. Every time the pad is depressed by the act of inking a stamp, a current of electricity is transmitted, which actuates the counter. When the stamping is effected by a lever the electrical contacts are connected to the lever.

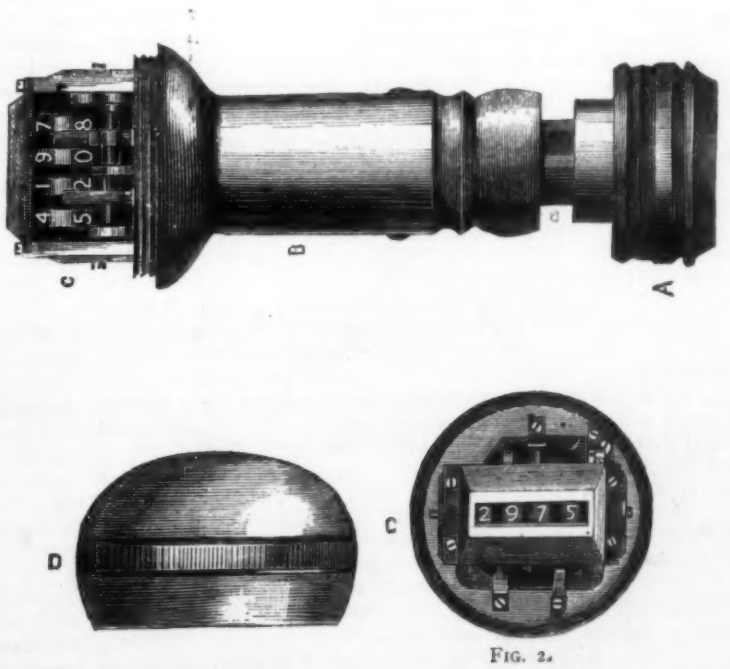


FIG. 2.

DETAILS OF SELF-REGISTERING STAMP.

Fig. 2 is a vertical section of a self-registering hand stamp. The stamp is fixed on a stem which is fitted to slide in the handle, B, and is pressed down by a spring, its down stroke being limited by stop pins working in a slot of the handle. On the handle is screwed a hollow cap, D, containing within it the counter, C, which can be inspected by unscrewing the cap. The first wheel of the counter is worked by a pawl lever from the sliding stem, *a*, of the stamp, and this wheel has twenty teeth, the unit barrel on which it is fixed having, however, only ten divisions. The barrels for the higher denominations are worked by gearing from the first in the usual way. Thus every time the stamp is subjected to pressure the first wheel is turned one tooth, and the unit barrel is therefore turned half a division. For each stamping operation the stamp is twice subjected to pressure, once on the pad for inking it, and once for delivering the ink on the letter or object to be marked or obliterated. The counter therefore records the number of double strokes of the stamp,

and therefore the number of single applications for marking or obliteration. The cap, D, is smooth and rounded externally so as to receive the pressure of the hand for inking and stamping, and it is made of the laterally bulged form shown, so that it presents considerable breadth to receive the pressure, and that it can be held firmly in the hand.

We may remark that the apparatus shown by the figures is manufactured by Messrs. Elliott Bros., of Charing Cross. —*Telegraph Journal.*

THE ELECTRICAL EXHIBITION AT PARIS.

[*Continued from first page.*]

On entering the palace from the Champs Elysées the splendid array of novel exhibits and brilliant decorations dazzles and confuses the visitor. The numerous pavilions, draped and ornamented with the flags of all nations, the strange machinery, the multitudinous wires, together with the vast proportions of the hall, overpower the sight, and it is not until after the lapse of several minutes that the order and plan of the exhibition are apparent.

In the center of the nave, resting in a great basin of water surrounded by plants, stands a veritable lighthouse. At its base floats the electric boat of Trouvé.

At each side of the entrance to the nave are huge lions, and above is a grand luster of iron work bearing Siemens lamps. The half of the hall to the right is allotted entirely to France, which has twice as many exhibitors as all the rest of the world. The other half of the hall has been allotted to foreign nations, the principal divisions being assigned to England, Germany, and America. The ten smaller divisions are occupied by Austria, Belgium, Italy, Russia, Sweden, Norway, Spain, Hungary, Switzerland, and the Netherlands. A striking feature of the British section is a handsome pavilion, with a red and white striped canopy, containing the electrical apparatus used by the post-office departments of London. Outside are several large tables on which are arranged the electric inventions and apparatus of the British exhibitors. One of the most conspicuous and popularly attractive exhibits in this section is a full-sized buoy carrying two Siemens lamps. Here also may be seen the great induction coil made by Mr. Appo at the suggestion of Mr. Spottiswood, the eminent electrician. This coil produces a spark forty-two inches long.

The German exhibits are presided over by a bust of Germania, whose domain embraces three large departments. The electric railway of Siemens is outside the building.

The American division is made conspicuous by the triple cluster of flags grouped round the pavilion. In this compartment are established the United States Signal Service exhibits, the Gray electro-acoustic telegraph, including the multiple or harmonic system, the Bell telephone, the interesting telephone of Dolbear, and many others. Considering the distance which everything had to be brought, the American exhibition is a remarkable one, and the Edison department promises to be as interesting as it is extensive.

The Belgic department has a very interesting display of lamps and telephones.

Italy is represented by a beautiful pavilion, which has *Italia* on the one side and *Roma* on the other, in large letters, and which contain, among other things, the historical apparatus of Volta and Galvani.

The Russian department exhibits, among other things, the apparatus of MM. Latchinoff and Tchikoleff.

The Dutch department has a fine exposition, the principal feature of which is the great electrical machine of Van Marum and his immense Leyden battery.

The Swedish and Norwegian departments promise to be interesting, as does also the Russian, but as yet very little of the machinery is in operation.

Underneath the galleries the great machines and dynamo-electric generators are established. The electric railroad is represented in this part of the building also.

The French pavilions dedicated to the several departments of electricity are very interesting. In one is the "Administration of Telegraph Lines," which shows all the apparatus employed. One pavilion, dedicated to the "City of Paris," shows all the electrical applications which have been put into use there, including the time service. Many of the rail road companies are represented by systems for indicating the movements of trains, etc., etc., Here also are wagons having electric brakes, and many other marvelous and interesting inventions.

The beautiful galvanoplastic objects of the well-known firm of Christofle attract much attention. The monumental stairway conducting to the galleries is at the lower end of the hall. A number of lights of different systems surrounding the nave make a brilliant display.

The hall of the balloon will be lighted by the Jablochkoff system; the great saloon of honor by the Maxim; the hall of the comparison of telephones by the Faure accumulator; as also the bath room and kitchen. The experiments of electric photography will be made by the Wilde light, and Edison lamps will illuminate the hall of conference and the adjoining hall.

The balloon of M. Tissandier glides above the heads of the spectators on the ground floor along a wire from one side of the galleries to the other.

The lower galleries to the left are devoted to the motors and magneto-electric machines. The other galleries to the left are dedicated to the accumulators of Planté, to the exhibition of the ministers of marine and of war, and the exhibition of the well known firm of Breguet.

Under-water Gold Mining in Georgia.

The cheapness with which large amounts of earth in river beds can be washed for gold by the new process of under-water hydraulic mining is awakening great expectations from the owners of river rights in Northern Georgia. Hitherto the cost of mining in the ordinary way has made the working of these streams comparatively unprofitable. By the new process it is claimed that the beds of the Chestattee and Chattahoochee Rivers cannot fail to yield abundantly. The Georgia State Geologist reports that two companies have been formed for prosecuting this work, using boats of the International Vacuum Dredging Boat Company. The first boat, now under construction at Dahlonega, is expected to begin work the middle of September. These boats cost from $6,000 to $10,000 each. Many miles of the rivers named have been leased for working, the price named being ten per cent of the yield.

Testing Seeds.

The following is a brief abstract of a paper, by Professor W. S. Beal, presented at a meeting of the Association for the Promotion of Agricultural Science, held August 16, in Cincinnati, Ohio.

Good fresh seeds varied much less in the per cent which germinated than did those which possessed little or low vitality. With the exception of two kernels in two different lots of fresh hand-picked wheat, 100 per cent germinated in all the tests made, excepting those in open ground, where 94·9 per cent out of 1,000 kernels germinated.

Some poorer old wheat, the history of which was not known, when tested in the same manner as the new wheat and at the same time, varied from 39 to 86·8 per cent in germination. Red wheat germinated more slowly than white wheat.

Wheat was once germinated and well dried in the sun. Quite a large per cent germinated a second time, depending on how far the process had gone before it was checked by drying. Of this well dried grain a considerable portion germinated the third time.

Seeds of pumpkins and the larger squashes tested at 80° Fah., or lower, showed variable and unsatisfactory results, while tested at 100° to 136° the per cent in germination was much higher and more uniform.

In all the above cases seeds were tested in lots of 50 or 100 seeds. They were tested in porous saucers kept damp, in damp sand, in soil in the garden, and in folds of damp paper.

Transmission of Power by Electricity in Mining.

The first instance on record of the application of electricity for the transmission of power is reported from France. M. Mathet has submitted the details to the Société de l'Industrie Minérale. The St. Claude shaft at Blanzy was sunk to the depth of 500 meters (1,640 feet), for the purpose of searching for a faulted portion of the coal seams, and a heading was run from it across the strata. When this heading had reached a length of 400 meters (1,312 feet) the ventilation became so poor that the temperature at the face rose to 95° Fah., and the miners could work only for a few hours. After some ineffectual attempts to improve the ventilation by simple means, it was decided to put in a fan 2·63 feet in diameter, and run it by power transmitted by electricity. An 8 to 10 horse power portable engine was put up above ground, and with it a Gramme dynamo-electric machine was run at a speed of 1,200 revolutions per minute. The electric current thus generated was conducted by a cable, consisting of seven 0·044 inch copper wires, to a second Gramme machine coupled directly with the fan, and placed in the heading near the shaft. Running at 700 to 800, it required 2½ horse power, the useful effect being at least 60 per cent. The temperature at the face was only lowered 5°, but the men could work in eight hour shifts. The return current was conducted from the underground machine by an iron wire cable. The cost of the whole plant is stated to have been only one-third of what a machine for delivering compressed air to the heading would have required.

MISCELLANEOUS INVENTIONS.

An improved axle lubricator has been patented by Mr. James V. Randall, of Newtown, Pa. This invention relates to self-lubricating axles which are provided with oil-cups at their outer ends and nuts for closing them. The object is to provide a simple and inexpensive lubricating device which shall be adapted for use in combination with the ordinary axle and axle box.

An improved paper-drying machine has been patented by Mr. James S. Piper, of Rockford, Ill. This improvement relates to machines for drying the wet sheet from an ordinary cylinder, Fourdrinier or other paper machine, the special object of the invention being to give a lap or belly to the sheet during the drying operation. The sheets so formed are used in making paper barrels.

An improved switch for dynamo-electric machines has been patented by Mr. Hans J. Müller, of New York city, The object of the invention is to facilitate connecting the internal and external circuits of a dynamo-electric machine in such a manner that any one current can be used to excite the magnets only, or to excite the magnets and perform work in the external circuit, while the other currents perform work in the external circuits only.

Mr. Armand Müller Jacobs, of Moscow, Russia, has patented a process of manufacturing sebacic or fatty acids from glycerides, consisting, first, in forming sulpho-sebacic acids by treating the oils with sulphuric acid and boiling this mixture with double its quantity of water; and secondly, in decomposing this sulpho-sebacic acid into sebacic acid and oxy-oleic acid by boiling it with water.

Mr. Joseph Klar, of Anna, Ill., has patented an improved mole trap which can be conveniently set and which will be reliable in operation. It consists of a platform with springs attached, a loop connected with the springs, one or two loops hinged to the main loop, a pivoted trigger having a catch point, a hinged catch rod to engage with the catch point of the trigger in setting the trap, and a stationary loop and flaring rows of rods to guide the animal to the trigger.

An improved button has been patented by Mr. Oscar Ericsson, of Sioux Falls, Dakota Ter. The object of this invention is to facilitate the attachment of buttons to garments or other articles, and to increase the strength and duration of the said attachment.

An improved earth auger has been patented by Mr. Edward A. Smith, of Greeley, Col. This invention is an improvement on the patent granted to the same inventor August 3, 1880, and the improvement consists in providing the semi-circular bottom of the cylindrical casing with the cutting blade, and the shaft with a semicircular cut-off plate, the edge of which is guarded by a projection on the bottom of the blade.

Linus W. Brown, of Algiers, La., has patented improvements in steering vessels by power gear, in which the power gear is entirely independent of the hand gear, and is applied direct to the rudder.

Mr. Edward J. Rawson, of Brooklyn, N. Y., has patented an improved folding table, which can be raised to form an inclined book rest, and can be placed upon a bed or sofa in such a manner that a person lying on his back can reach the articles on the table very conveniently.

Mr. Joseph Thorpe, of Jersey City, N. J., has patented an improved photographic plate holder, in which two sensitive plates may be carried and successively exposed. This plate holder is provided with a central sliding carrier which contains a partition, on each side of which a sensitive plate is carried.

An improved shot case and distributer has been patented by Mr. Sinclair Booton, of New York city. The object of this invention is to improve the construction of the shot cases and distributers for which Letters Patent No. 110,625 were issued to the same inventor January 3, 1871.

An improved water closet and bidet bowl has been patented by Mr. John Flanagan, of Newburg, N. Y. The invention consists in making a water closet and bidet bowl with recesses in its rim to allow the hand to be introduced for bidet purposes; also, in constructing the trunk or pot with embossments upon the opposite sides of the lower and upper parts to receive inlet and outlet air pipes for ventilating the trunk.

A regulator for nursing bottles, patented by Mr. Willard C. Carpenter, of North Stratford, N. H., is designed to allow regulation of the amount of milk drawn out, according to the age and requirements of the child. It consists in a regulating plug or faucet combined with the rubber feeding tube.

An improved machine for washing and beating yarn has been patented by Mr. Polydore Dorgeval, of Paterson, N. J. These improvements relate to machines for washing yarn in hanks, and have for their object to facilitate the introduction and removal of the hanks and to render the washing operation perfect.

A PIPE LINE FOR NATURAL BRINE.

In a report on the saline interests of Michigan, Dr. S. S. Garrigues, State Salt Inspector, mentions the construction of a pipe line for conveying brine from East Tawas to Oscoda, to be finished this fall. The pipe is of nine inch bore, of the Wyckoff patent, manufactured by the Michigan Pipe Company, and is expected to deliver brine enough to make at least 1,000 barrels of salt a day. The pipe will be laid three feet underground, and will be twelve and a half miles long. The difference of level between the two points is not given. The pumping works, consisting of two tubular boilers, 6x16, and two powerful engines, with necessary machinery, will be at East Tawas. The salt rock at that place is 196 feet thick, and its brine produces salt second to none in the State. The wells there yield on an average 200 barrels a day, while at Oscoda the yield is but about 30 barrels, and the wells do not furnish a supply equal to the capacity of the works.

Machines to Destroy.

To the Editor of the Scientific American:

You have in your issue of September 3 an article on "Fast Lumber Cutting in the Puget Sound." Yes, it is wonderful how we have progressed in wood cutting and wood working machinery, and we thereby cut up in ten years as much lumber as formerly would have taken one hundred years. We shall soon be in the same fix with all our timber scarcity as you described in an article lately on the black walnut. In fifty years from now, it seems, we can break up all our saw mills and wood working machinery, as there will be no timber to cut unless some one can come to our help and invent a timber growing machine. Are we not a great nation to invent machinery to destroy, so as to turn everything into cash, as illustrated by the new invention to catch salmon described in yours of September 3?

G. H. TIMMERMAN.

St. Louis, Mo., September, 1881.

Progress in Canoe Building and Rigging.

The second annual meeting of the American Canoe Association was held at Lake George in the fore part of August. Between sixty and seventy canoes and a large number of canoeists were assembled. Nearly all of the canoes were wooden canoes of the "Shadow" model, and Rob Roys of the American traveling canoe model. There were a few canvas canoes owned by those to whom cheapness was a prime object. A very intelligent review of the results of the meeting, from the standpoint of the practical canoeist, is given in the *Times*. The writer says:

"While nearly all of the American canoes are decked over and are propelled by the double-bladed paddle, most of the Canadian canoes are without decks, and the Canadian canoeists cling to the single-bladed paddle. It will readily be conceded that for hunting and fishing the open canoe has certain advantages over the decked canoe, but the superiority of the latter for cruising was clearly shown at the Lake George meeting. During a four mile paddle against a strong headwind from Canoe Islands to the race course, the open canoes were compelled to resort to bailing, while the decked canoes were perfectly dry. Half a dozen races also established the fact that the double-bladed paddle could drive a Rob Roy canoe faster than the single-bladed paddle could drive the lighter Canadian craft. While the peculiar method of building employed by the builders of the Canadian 'Peterboro' canoes excited general admiration, and while the lightness and beauty of the canoes themselves were undeniable, the superiority of decked canoes and of the double-bladed paddle was too manifest to admit of doubt, and the establishment of this fact was among the most important results of the Lake George meeting.

"Another fact definitely ascertained at Lake George was the great superiority of one particular rig over all others. To properly rig a canoe, the sails of which must be managed by the canoeist without leaving his seat, is a difficult problem. The different kinds of rigs which have been tried by English and American canoeists are legion, but each one had its manifest faults. The leg of mutton, the sharpie, the standing lug, the balance lug, and the boom and gaff sail have all had their advocates, and were all fairly tried at Lake George in competition with a new modified lateen rig, used by the canoeists of the Cincinnati Canoe Club, and the superiority of the latter was conceded without a dissenting voice. In simplicity, efficiency, and beauty it was found to be nearly perfect, and its universal adoption as the only rig which is perfectly adapted to a canoe is among the certainties of the near future."

A New Pipe Line.

The Buffalo and Rock City Pipe Line Company began to deliver oil at Buffalo August 23. The line of pipe is between 63 and 64 miles in length and 4 inches in diameter. Rock City, at its southerly terminus, is an oil village near the Pennsylvania State line, and occupying an elevation 1,900 feet above Buffalo. At this point are situated large iron tanks, with a capacity of 25,000 barrels each, for receiving the oil. There is a pump station supplied with improved triplex pumps for pumping the oil, and smaller pumps for supplying to the boilers. Gas from the surrounding wells is used for fuel. Were it not for the intervening hills and valleys between Rock City and Buffalo oil could be pumped through the entire line with ordinary pressure in consequence of the numerous high places that the line passes over. A second or relay station is situated about midway between the termini of the line. From this relay station the oil is taken up as it comes from Rock City and is forced to Buffalo. Before starting the oil the line was tested with water; hydraulic gauges were put on the line at various points where pressure would be the heaviest, and also at the pumps. By the use of these gauges the speed of the pumps and the gauge of the tanks were taken at stated times, and a record of the pressure and the duty of the pumps was obtained. A report for one hour showed that the pressure was 375 pounds at Rock City and 625 at Allegany, a point 950 feet below. The duty of the pumps was 150 barrels an hour. The pipe was tested to 1,200 pounds. On sending in the oil the pressure at Rock City was 200 pounds and 480 at Allegany, with the same result on the duty of the pumps, showing that nearly double the amount of oil can be pumped through the line on the same pressure required for water. This is the first independent line organized under the act of 1878. The tanks at Buffalo have a capacity of 148,000 barrels.

High Buildings and Elevators in New York.

An increasingly characteristic feature of the business portion of New York is its lofty buildings for offices. Of the score of office buildings now going up or nearly finished there is only one—the Stock Exchange—which is less than twelve stories high. The Stock Exchange is only four stories high, it is said, for the reason that if it had been carried higher and the upper floors rented to brokers the competition would have been so great for these offices that ill-feeling would have been engendered.

Recently a journalist had occasion to make a dozen business calls in this part of the city, and out of curiosity kept a record of the height he traveled in elevators. He says:

"For eleven of the twelve calls I had to enter an elevator, and twice I retraced my steps, finding my man out the first time. Adding up the number of stories I was lifted, I find that I went up sixty-two stories, or a total height of 806 feet, allowing an average of 13 feet to each story—a very small average. This is nearly twice the height of the Great Pyramid of Egypt, and any traveler who goes to the top of the Great Pyramid in less than half an hour on a hot day will be able to estimate the saving in strength effected by our New York elevators. If all our elevators were to break down at once business would come to a standstill.

MECHANICAL INVENTIONS.

Mr. Francis A. De Bremon, of Clifton, N. J., has patented a new and improved device for furnishing a continual supply of lubricating substance to the shaft or axle of a wheel. The invention consists in a box containing the lubricant, and provided with a follower and a spring for pressing this lubricant to the inner end of the box, from where it flows to the axle through a tube and along a wire contained in this tube and pressed against the axle by a spiral spring, whereby the axle is furnished with a constant supply of the lubricant.

An improved boiler-flue scraper has been patented by Mr. John L. Kelley, of Erie, Pa. The object of this invention is to construct a simple, durable, and effective device for scraping and removing soot, etc., from boiler flues.

Mr. James Curran, of New York city, has patented an improved heat alarm for signaling changes of temperature with an expansion rod to be inserted in the heated tank or chamber, a compound lever for multiplying the changes in length of the expansion rod, a connecting rod, and a steam valve and whistle connected with the heating pipe, whereby changes in length of the expansion rod will open the steam valve and cause the whistle to give a signal.

Mr. Oscar Bihet, of Liege, Belgium, has patented an improved machine for coiling a band or rod of metal into the shape of a helix or volute spring. The invention consists in a machine provided with a helical mandrel mounted on a suitable shaft, and provided with a detachable hook for seizing the bar or rod of which the spring is made, immediately after the same leaves the furnace, which bar or rod passes over and between suitable guards, and is pressed upon the mandrel by a flanged roller loosely mounted on a shaft journaled in the ends of a fork attached to a vertical shaft, that is forced downward by a spring surrounding it, and is provided with a screw passing through a hand wheel, by the rotation of which the flanged roller may be raised.

An improved endless belt filing machine has been patented by Mr. Deloss H. Stephens, of Riverton, Conn. This machine is intended for the purpose of smoothing articles fed to the files by a carriage actuated by a foot lever and a connecting rod. It consists in a novel arrangement of an endless band file carrier, grooved pulleys, and grooved guides

Sulphurous Acid as a Bleach.

For bleaching wool, silk, and straw, sulphurous acid, or sulphurous anhydride, as it is frequently called, has long been employed, and the old method of generating it for the purpose by burning sulphur is still the most common. But the operation is attended with more or less uncertainty, and the want of uniformity in the results is frequently a source of annoyance to the bleacher, if not of positive loss. Now, this uncertainty is mainly due to the varying conditions of the atmosphere of the bleach chamber. The temperature to which the textiles are subjected there is far from being uniform. The proportion of sulphurous acid in one portion differs widely from that in another, and the acid is far from pure.

The impurities in the gas come from the impure form of commercial sulphur, which must of necessity be used. The rate and direction of the circulation of the gas must depend upon the rate of combustion; which, at first sluggish, becomes active as the sulphur melts, until the liquid reaches so high a temperature that a portion of it is volatilized unconsumed and rises in the form of vapor, mingled with the sulphurous acid. The latter, familiarly known as a fire extinguisher, prevents the combustion of the volatilized sulphur until perchance it reaches the fabric to be bleached, where, meeting with conditions favorable to combustion, it is consumed, producing a slight stain. This is especially noticeable on silk but moderately dampened.

Bleaching by means of burning sulphur must indeed be regarded as a rude process, nor can it be called economical, for in order to guard against the effects of its uncertainty, a large quantity of sulphur is employed, the length of time during which the goods are suspended in the bleach chamber is prolonged, and the number of times they are so suspended is multiplied. Twenty-four pounds of sulphur are roughly estimated as necessary to bleach two thousand yards of woolen fabric during an exposure lasting twelve hours, and in practice it is washing with soda lye and fair water intervening, subjected to two and sometimes to three such exposures before the bleaching is regarded as finished. Sulphurous acid is very soluble in water, and vats containing solutions of it have been substituted for the chamber; but these solutions soon undergo a change, a portion of the sulphurous acid being converted into sulphuric, which impairs the softness of the fiber, if not its strength.

The cheapness with which the soluble salts of sulphurous acid can be made has led to attempts at their introduction; and the facility with which they may be decomposed, eliminating pure sulphurous acid, is also in their favor. Further and careful experiments on their employment would seem to be demanded by the wants of the bleacher.

Sulphurous acid is readily condensed into a liquid, being at ordinary temperatures liquefied by a pressure of two atmospheres; and its preparation in the manufacturing laboratory, and its sale in suitable condensers, were proposed years ago, but its use did not at that time receive the sanction of practical men. Since then our means of condensing gases have been greatly improved, and Prof. Raoul Pictet, of the University of Geneva, Switzerland, than whom no better authority can be desired, strongly recommends the condensed gas for bleaching purposes. Recently he condensed into a strong vessel of the capacity of 1 liter, 325 liters of the gas, which, probably from its purity, had, when allowed to escape into the atmosphere of the chamber, great penetrative power, passing rapidly through fabrics almost impermeable by air.

Bleached in this manner, the most delicate silk fiber loses none of its elasticity or strength. A number of Swiss silk manufacturers have already adopted the use of the condensed gas, which promises soon to become a commercial article in all civilized silk producing countries, and ere long to render the practice of bleaching wool and woolens by gas evolved from burning sulphur in the bleachery a thing of the past.—*Textile Record.*

The Prevention of Disease.

"Prevention is better than cure and far cheaper," said John Locke, two hundred years ago; and the history of medical science has since made it more and more probable that, in a stricter sense of the word, prevention is the only possible cure. By observing the health laws of nature, a sound constitution can be very easily preserved, but, if a violation of those laws has brought on a disease, all we can do by way of "curing" that disease is to remove the cause; in other words, to *prevent* the continued operation of the predisposing circumstances.

Suppressing the symptoms in any other way means only to change the form of the disease, or to postpone its crisis. Thus, mercurial salves will cleanse the skin by driving the ulcers from the surface to the interior of the body; opiates stop a flux only by paralyzing the bowels—*i. e.*, turning their morbid activity into a morbid inactivity; the symptoms of pneumonia can be suppressed by bleeding the patient till the exhausted system has to postpone the crisis of the disease. This process, the "breaking up of a sickness," in the language of the old school allopathists, is, therefore, in reality, only an interrupting of it, a temporary interruption of the symptoms. We might as well try to cure the sleepiness of a weary child by pinching its eyelids, or the hunger of a whining dog by compressing his throat.

Drugs are not wholly useless. If my life depended upon a job of work that had to be finished before morning, and the inclination to fall asleep was getting irresistible, I should not hesitate to defy nature, and keep myself awake with cup after cupful of strong black coffee. If I were afflicted with a sore, spreading rapidly from my temple toward my nose, I should suppress it by the shortest process, even by deliberately producing a larger sore elsewhere, rather than let the smaller one destroy my eyesight. There are also two or three forms of disease which have (thus far) resisted all unmedicinal cures, and can hardly be trusted to the healing powers of nature—the *lues venerea*, scabies, and prurigo—because, as Claude Bernard suggests, their symptoms are probably due to the agency of microscopic parasites, which oppose to the action of the vital forces a life energy of their own, or, as Dr. Jennings puts it, "because art has here to interfere—not for the purpose of breaking up diseased action, but for the removal of the cause of that action, the destruction of an active virus that possesses the power of self-perpetuation beyond the dislodging ability of nature."

But with those rare exceptions it is better to direct our efforts against the cause rather than the symptoms—*i. e.*, in about ninety-nine cases out of a hundred it is not only the safer but also the shorter way to avoid drugs, reform our habits, and, for the rest, let nature have her course; for, properly speaking, disease itself is a reconstructive process, an expulsive effort, whose interruption compels nature to do double work; to resume her operations against the ailment after expelling a worse enemy—the drugs. If a drugged patient recovers, the true explanation is that his constitution was strong enough to overcome both the disease and the druggist.—*Dr. Feliz L. Oswald, in Popular Science Monthly.*

Trial of Steam Launches in England.

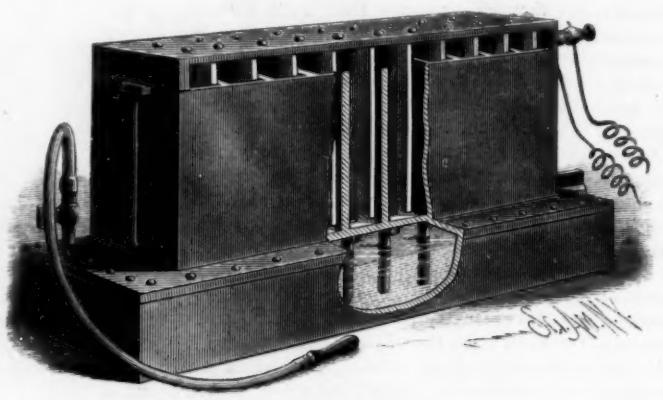
An exhaustive series of comparative trials, extending over three days, has just been made by the steam departments at Portsmouth Dockyard with a Herreshoff and a White's 48 foot pinnace. The Herreshoff is worked on the inventor's coil boiler principle, and has both the engine room and the stokehole inclosed, forced air being used at a pressure of 2 inches as measured by the water gauge. White's, on the other hand, is an ordinary service pinnace, having only the stokehole inclosed, and is propelled by twin screws. As the result of six runs on the measured mile in Stoke's Bay, the Herreshoff realized a mean speed of 15·124 knots, and White's a speed of 12·604 knots an hour. No diagrams were taken, as Mr. Herreshoff objected to their being taken with a closed engine room, so that the horse power developed was not ascertained. The vessels were also tested with respect to the economical consumption of fuel. Each pinnace took on board 10 cwt. of coal, and, having proceeded to the westernmost measured mile buoy, was kept running at full power until the engines stopped for want of steam on the consumption of the coal. The Herreshoff went twenty-eight times round the buoys before its fuel was exhausted, while Mr. White's boat, after going twenty-nine times round the buoys, proceeded into harbor, having, according to the London *Times*, 258 pounds of coal unconsumed at the end of the trial.

NEW PORTABLE BATTERY.

We give an engraving of a very compact and powerful battery recently patented by Mr. Marcus A. Hardy, of Newport, R. I. It is designed for medical and experimental purposes, and is very convenient and portable. The battery comprises twenty elements, and the cells are made in one entire piece of hard rubber, which is known to be indestructible with proper use. The construction of the battery is such that all of the cells can be filled in twenty seconds from the reservoir forming the base, and the exciting fluid remains in contact with the zincs and carbons only during use. Any number of cells, from one to twenty, may be brought into use as may be required. The battery cell forms the top to a hollow base or reservoir, and from each cell a small tube projects into the hollow base nearly to the bottom. To the base at one end is attached a stopcock, to which is connected a rubber tube terminating in a mouthpiece. At the opposite end of the reservoir there is a screw-capped opening for introducing the exciting liquid. The zinc and carbon plates are attached to brass connecting pieces secured to a common support of hard rubber. The connections are arranged so that the zinc of one cell is in electrical communication with the carbon of the next, and so on throughout the series. The opposing ends of the series are connected with binding posts at the end of the battery.

The brass connectors between the elements are drilled so that plug connections may be inserted to cut out any number of cells.

This battery finds an extensive application in torpedo service, and it appears to be extremely well adapted to laboratory use.

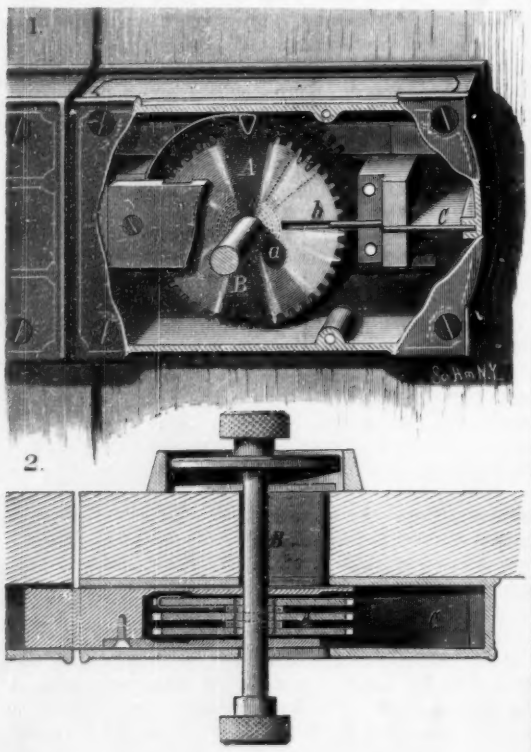


HARDY'S PORTABLE BATTERY.

IMPROVED PERMUTATION LOCK.

The engraving shows a permutation lock of improved and simplified construction recently patented by Mr. Fred. E. Arnold, of 189 West Harrison street, Chicago, Ill. The bolt is arranged to slide in a seat in the lock casing, and the rear end of the bolt is divided longitudinally into two branches, for engagement with a tongue, C, which extends from the end of the lock and which also engages with the teeth on the peripheries of the wheels, A.

A shaft, B, extends through slots in the lock casing and through round holes in the bolt and in the centers of the wheels, A, and is provided with knobs or milled heads at the ends for operating it. It is also provided with a pin, *a*, for engaging with notches in the centers of the wheels, A, by which the wheels are turned. The wheels, A, are each



ARNOLD'S PERMUTATION LOCK.

provided with a radial notch, *b*, for engagement with the tongue, C, when the bolt is moved back.

A spring pawl provided with a tapering nose engages with the teeth of the wheel, A, the fixed end of the spring being attached to the bolt. In this invention the wheels, A, move with the bolt. The bolt being locked, in order to unlock it the shaft or key, B, is adjusted so that the pin, *a*, will engage with the notches of one of the wheels, A, and is turned until the arm shown in dotted lines abuts against the tongue, *c*. The wheel is then turned in the reverse direction until the radial notch, *b*, is exactly in line with the tongue, C. The shaft is then shifted lengthwise, and the same motions applied to the other wheel or wheels, so as to bring all the notches, *b*, in line with the tongue, C, and allow the wheels and bolt to be moved back. Where there are three of the wheels, A, employed, a ring and a wheel or plate is attached to the shaft, B, to enable the operator to adjust it to the center wheel by moving the shaft outward until the outer surface of the wheel or plate is flush with the outer edge of the ring. After adjusting the center wheel the shaft is pulled further out, so as to bring the wheel or plate clear of the edge of the ring, and the shaft is then free to move in the slots of the casing in order to move back the wheels and bolt.

Work and Wages in China.

The United States Consul-General at Shanghai has made a special investigation and report on the wages and modes of living of the working people of China. Skilled laborers —artisans, workers at trades, etc.—live mostly in the cities, where all prices are higher than outside. Art and taste, although appreciated, are not paid accordingly. A painter may win renown, and his name or his seal may live after him; but during life he will be no better off than his neighbor who makes coffins. Painters of porcelain, designers and weavers of the most exquisite patterns of silks, and the artisan who makes wonderful pieces of enamel or "china," are satisfied if they put by enough for burial expenses; the butcher does as well as any of them. Gold and silver smiths, and others whose work is peculiarly responsible, do a little better; the weaver or spinner of silk is probably the best paid day laborer, getting $1 to $2 a day. The average pay of skilled labor is probably $3 a week for a master, $1.50 for a workman, and 50 cents for "youngsters or females."

The master lives generally at his workshop, having $20 to $30 worth of household goods; he pays $72 a year for food, $36 for rent and sundries, $12 for clothing, and is rich with $36 left. The ordinary workman, if unmarried, lives with his parents or with some friend. His effects may be worth $15, and he pays $45, $12, and $8 for the three items above mentioned. Females and youngters are assumed to cost all they can earn. On the farm everybody must work, the children beginning at six years. Two and a half acres of arable land, with a house built of mud and reeds and thatched with straw, and a cow, a few fowls and pigs, and some very primitive tools, may constitute a well-to-do farmer's property. The soil will usually support the family, and 20 cents a day will pay for their food. Rice, or bread, with vegetables and common tea, varied by a little poultry or pork on festive occasions, makes their diet. Their bit of land may be worth $400, their annual working expenses may be $42, and they will produce about $160, leaving about $50 clear. In cotton the land will average 1,600 pounds at 4 cents; cost of cultivation and tax, $31; net yield, $33, if the soil suits cotton. A woman weaves one piece per day of cotton cloth, 6 to 9 yards, 39 to 46 inches wide; she spins one-third of a pound of yarn, at 6 cents for labor; 6 working days convert the raw fiber into 1⅓ pounds of cloth, worth 60 cents.

The farm laborer gets 10 to 15 cents a day, or 70 cents to $1.05 a week, in harvest time, besides his food, estimated at 10 cents a day; by the month, $1.50 to $2 and board; by the year, $12 "and found." About $2 a year will clothe him, and he does well if he saves twice that in a year. For cooly labor, comprising boatmen, carriers, wheelbarrow-men, etc., from 5 to 30 cents a day are paid; the carriers in West China, who carry for 20 consecutive days 300 to 400 pounds of tea on their backs over a mountainous country, are considered well paid at 25 cents a day. The ordinary cooly earns $4.50 a month, and spends $4. Coal is mined entirely by hand, and sells at the pit's mouth for $1 a ton. Gold diggers on the Han River, in 1870, were earning 5 to 15 cents a day; 7 men were estimated to wash 20 tons of gravel a day, yielding 3 or 4 cents to the ton. The Chinese soldier costs $67 a year.

Resonant Sand.

M. Lenz, in a recent communication to the Geographical Society of France in regard to his voyage to Timbuctoo, speaks of a curious phenomenon that he witnessed, and which he calls "resonant sand."

"In the Inguidi," says he, "a region of sand dunes very difficult to cross, I observed a phenomenon which was as rare as it was interesting—resonant or musical sand. All at once one hears in the desert, issuing from a sand dune, a prolonged, smothered sound quite like the noise of a trumpet. It lasts for some seconds, and then stops to resume itself in another direction. The phenomenon renders the traveler anxious. I suppose it proceeds from the friction against one another of the burning hot grains of quartz, which are simply laid one over the other and are always in motion."—*Revue Scientifique.*

Quill Pens.

An advertisement in a morning paper for an experienced quill pen cutter called out an interview with the only quill pen importer and manufacturer in this city. He said that twenty years ago there were several quill pen makers here and in other cities. Now one in Philadelphia and himself are all that he knows. Quill pens are used mainly by old lawyers and judges, partly from custom, but chiefly because they are easy to write with. Most of the quills come from Russia. The Russian goose has a hardier quill than our geese. An unclarified pen from the wing of a Russian goose is the most durable. The German quills have the best plumage. A two-dozen box of good quills will last two or three months easily for a man who knows how to mend his own pens.

The instrument used in pen making is the ordinary blade of the penknife, inserted firmly into a wooden handle of peculiar shape, tapering to a point. A pen is made with two cuts or three. The blunt end of the quill is first cut off, because it is not tough. Then the point of the handle is inserted, and the quill is carefully split for a certain distance. Two slashing cuts then form the nib, and the pen is done. The plumage is neatly trimmed.

Swan quills are sometimes used for pens, but are very much more expensive than the common goose quill. Quill pens are sold at retail for about three shillings a dozen. The demand is steady, such as it is, but it is growing less year by year.

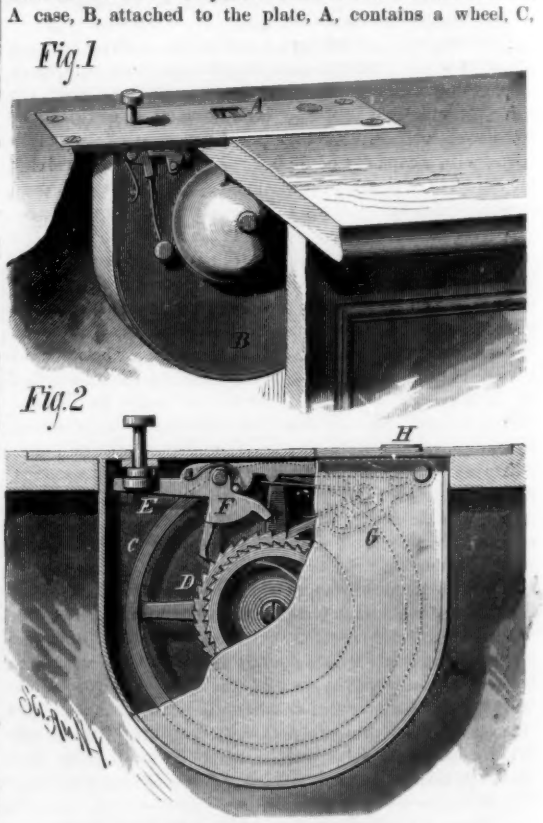
NOVEL CLOTH REGISTER.

It is no unfrequent thing for a salesman, while measuring cloth, to lose his count upon being disturbed by customers or otherwise, when the cloth must be remeasured or measurement guessed at; the first unnecessarily consuming time, the second making no end of trouble.

The engraving shows a compact and simple device for avoiding these difficulties, by registering each yard measured off, so that there will be neither mistakes nor delays.

Fig. 1 is a perspective view of the register, showing the manner of attaching it to the counter; and Fig. 2 is a side elevation, partly in section, showing internal working parts.

The plate, A, is let into the counter, with the projecting knob at the end of the yard measure laid off on the counter. A case, B, attached to the plate, A, contains a wheel, C,



HARRISON'S CLOTH REGISTER.

whose periphery is numbered from 0 to 40, or more or less as the case may require. These numbers show through an opening in the plate, A, and may be seen by both salesman and customer.

A lever, E, pivoted in the case, B, carries a pawl, F, which engages the ratchet, D, on the side of the wheel, C. The pawl, F, is provided with a detent, which prevents the ratchet, D, from moving more than one tooth at a time.

The ratchet wheel, D, is engaged by a retaining pawl, G, against which the teeth of the wheel are pressed by a spiral spring contained in the center of the wheel, C.

The pawl, G, is provided with an arm extending backward and engaged by a button, H, which reaches through the top plate, A.

As the wheel, C, is advanced one number at a time by pressing the knob, at the end of every yard measured the

bell at the side of casing, B, rings, indicating that one yard has been measured.

This operation gradually winds the spring in the center of the wheel, C, so that all that is necessary to return the numbers to 0 is to release the wheel by pressing the button, H.

This device will undoubtedly save a great deal of time and trouble wherever adopted in our drygoods stores.

Further particulars may be obtained by addressing the Harrison Manufacturing Company, 48 and 50 Duane St., New York City, or Brenham, Texas.

ENGINEERING INVENTIONS.

An improved stock car has been patented by Mr. Coroden J. Slafter, of Grand Junction, Mich. The object of this invention is to facilitate the transportation of animals in cars, and promote their comfort while being transported.

In pulverizing and concentrating ore for smelting a considerable portion of the ore, which is of light specific gravity, floats as a scum on the surface of the water as it passes from the stamp mill or pulverizer to the concentrator and is thrown off as waste. It has been found that this scum is very rich in the metals which are sought to be saved, the said metals existing in the scum as sulphurets, chlorides, oxides, etc., which, by reason of their comparatively light specific gravity, do not readily sink to the bottom with the other ores, but float on the surface. Mr. Patrick H. Dunagan, of Boulder, Col., has patented an apparatus for saving and separating this scum. This apparatus is designed to be placed between the pulverizer mill and the concentrators, but it may be made to act upon the tailings or any form of pulverized ore, with valuable results.

An improved paddlewheel, recently patented by Mr. James W. Danforth, of Elizabeth, N. J., is intended to prevent the paddles from lifting water as they rise therefrom.

An improved ore amalgamator has been patented by Mr. William H. Howland, of San Francisco, Cal. The invention consists in a stirrer formed by a rotary yoke carrying paddles combined with a pan fitted with dies, against which the pulp is forced by the paddles, and an inner ring that insures the circulation of the pulp.

EGGS OF BIRD PARASITES.

Among the little bird parasites are to be found the most extraordinary and fantastic structures.

The eggs of one of the species which infest the ground hornbill so much resemble the cells of some of the polyzoa that, deposited as they are in close contact one above another, and in many parallel lines between the flattened barbs on the inner surface of the feathers, they appear like some new species of sea-mat.

The strangely formed eggs found on the Australian crane are arranged in a similar manner, and a slide containing several rows of these eggs is a fine sight under the microscope.

On one species of crowned crane (Balearica) are found eggs having a thick calcareous wall, being covered, as it were, with little white domes. Each of these projections appears to be deposited around and supported by a short spine proceeding from the shell of the egg, and supported by a subquadrate, pellate disk.

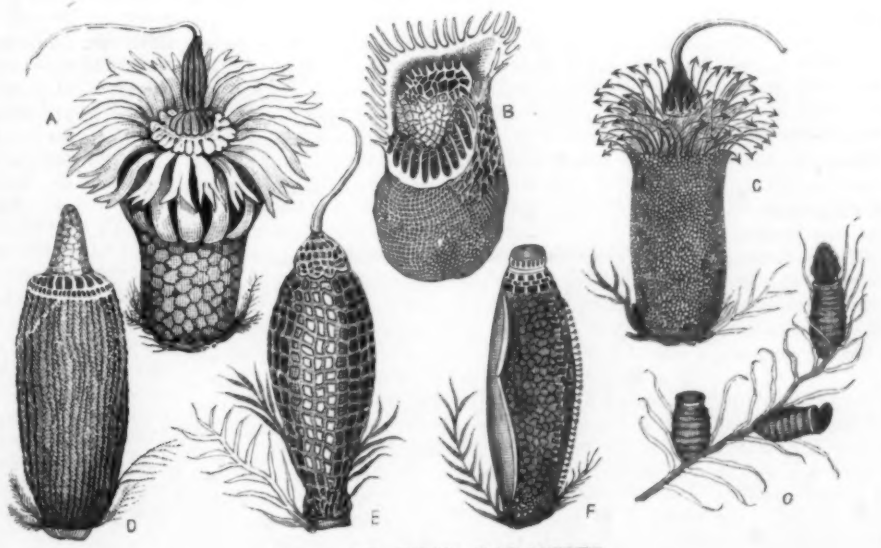
The egg of a parasite of the Australian mallee bird resembles somewhat the ripe fruit of the corn blue-bottle flower. The spines on the lowest or outer row on its summit are ornamented by little anchors, very like those of the Spicula synapta.

All these interesting eggs are, however, altogether exceeded in beauty by those of the Indian black-winged peacock, which are constructed so much like flowers that a botanist might amuse himself by describing every part of them in the technical language of his science.

The manner in which these eggs are deposited is also most singular. The animal attaches a mass of amorphous secretion to the inner side of the shaft of a feather, and then proceeds to construct two or three oval perforated or punctate sacs, much larger than the eggs. On and about, and in some cases buried, in these strange sacs are found the eggs in considerable numbers, the whole making a very interesting object for the microscope.

It is, of course, extremely difficult to tell the genera to which the eggs respectively belong. With foreign birds especially it is almost impossible to do more than form a probable guess on the subject. The peacock has a fine specimen of goniodes, and the common turkey is infested by a large goniodes and a lipeurus. There is a remarkable species of acarus, described by Dr. Robins, found spinning a white silken web on the base of the sparrow's thigh, or on the forepart of its body. On raising this delicate web you perceive that it is filled with minute eggs, from which the young issue, being in due time hatched by the warmth of the body they are destined to annoy.

Perhaps this slight sketch may induce some naturalist or microscopist to pay attention to a little known page in the wonderful book of nature we are all trying to decipher.



EGGS OF BIRD PARASITES.

A, Parasite of Black-winged Peacock.—B, Ground Hornbill.—C, Australian Mallee Bird.—D, Common Hornbill.—E, Golden Pheasant.—F, Crowned Crane.—G, Showing how the eggs are fastened to a feather, with a parasite issuing from the egg at the expiration of two days.

ANCIENT ROMAN POTTERY.

The pottery of the ancient Romans has a distinctive character which lies chiefly in the peculiar texture of the ware and in the ornamentation. The Romans made immense quantities of pottery for useful purposes. Bricks and tiles for draining, for walls, for roofs, and for other uses, were a great source of revenue to land owners and potters. The engraving shows an ancient Roman altar decanter of graceful form and simple yet elegant ornamentation. This class of pottery has been much imitated of late.

ANCIENT ROMAN ALTAR DECANTER.

The Tenure of Life.

An industrious German, Baron G. F. Kolb, has lately compiled a book of universal statistics which furnishes much food for thought. His figures show that every advance made by a people in morality, in profitable and healthy employment, and useful knowledge brings it nearer to the ideal—the greatest natural tenure of life. Domestic virtue also tells favorably on the health and wealth of a population. Thus in Bavaria, out of 1,000 children born alive there died, of legitimate children, 248 boys and 212 girls; of illegitimate, 361 boys and 342 girls. Out of 100 children suckled by their mothers, only 18·2 died during the first year; of those nursed by wet nurses, 29·33 died; of those artificially fed, 60 died; of those brought up in institutions, 80 died in the 100. The influence of prosperity or poverty on mortality is also shown by Baron Kolb. Taking 1,000 well-to-do persons and another 1,000 of poor persons—after five years there remained alive of the prosperous, 943; of the poor, only 655. After fifty years there remained of the prosperous, 557; of the poor, 283; at seventy years of age there remained 235 of the prosperous, and of the poor, 65. The average length of life among the well-to-do was 50 years, and among the poor 32 years.

One of the most potent shorteners of life is the anxiety of providing for bare subsistence. The lack of sanitary conditions also shortens man's years. Idleness, as compared to intense industry, outweighs—prejudicially outweighs—all the advantages of ease and abundance.

Mineral Wax in New Zealand.

A large deposit of crude paraffin, or mineral wax, was discovered near Gisborne, New Zealand, last May. Mr. J. H. Stubbs, chemist at Port Jackson, after an examination of samples, reports the following as an approximate analysis:

"Paraffin 50, kerosene 10, light oils 10, heavy oils 20, earthy matter 10 per cent. The above is more remarkable for the almost total absence of tar, which is present in all petroleum. The present market price of paraffin is £80 per ton, and as the deposit appears to be extensive, it could be utilized at once without any costly machinery. Paraffin is chiefly obtained from the shales of Scotland and the more valuable petroleums of the States. There is only one other district in the known world, Galicia, where it is found crude under the name of ozokerite, and in such a state of purity as that recently discovered in our midst."

Mr. Stubbs has evidently not heard of the large deposits of mineral wax discovered in Utah a year or two ago.

Ceylon Pearl Fishery.

The pearl fishery which has just closed in Ceylon has been one of the most successful on record. The pearls procured from the oysters on the banks situated off Silavaturai, on the western coast of that island, have been famous from time immemorial for their purity, shape, and color. In these attributes they far surpass those obtained from the oysters of the Persian Gulf, although they are, as a rule, inferior to the latter in size. The oyster of the Arippu banks is scientifically known as the *Meleagrina margaritifera*, and is of a species not existing on all pearl oyster banks, and of a different genus altogether to that found in the Tamblegan Lake, near Trincomalee, on the eastern coast of the island, which is termed the *Placuna placenta*. The earliest fishery of which we can find any detailed record took place in the year 1796; and from that date the Ceylon Government, up to the year 1874, derived a sum of £1,013,113 from this source. The pearl oyster is curiously migratory in its habits; and from one cause or another the banks are for years together almost totally deserted by them, and long intervals elapsed during which the fishery has, from this peculiarity, been closed, rendering the return from it quite unreliable as a source of settled revenue. Thus from 1732 to 1746, from 1768 to 1796, and from 1833 to 1854, there were no fisheries at all, and it was feared at the latter date that the oysters had altogether deserted the banks.

A few words descriptive of the system under which a fishery is conducted will be of interest. A report having been received from the inspector that there are sufficient oysters of mature age on the banks, the Government advertises a date for its commencement. A large number of boat owners, both Ceylonese and from the opposite coast of India, apply to enrol their boats, and these, probably to the number of 150 to 180, are divided into two fleets, sailing under red and blue flags, which proceed to the banks, situated some six miles from the shore, on alternate days. Each boat provides its own crew and divers, and has on board a guard, whose duty it is to see that the oysters fished are not surreptitiously disposed of. Each diver stands on a flat stone attached to the diving rope, and after taking a long inspiration, closes the nostrils with one hand, and descends on the stone to the bottom, where he hastily collects as many oysters in his basket as the time he is able to remain at the bottom admits of. This varies very much with the capacity of different men; but in spite of all assertions to the contrary, we believe that few divers can stay below beyond forty-five seconds. At a given signal the boats all sail for the shore, and on their arrival they are unloaded under inspection, and the oysters placed in the Government kottoos—palisaded inclosures with a cement floor. Here the oysters are counted, and the proportion due to the boat owners for their services is made over to them. The remainder, which is the property of the Government, is put up to auction and sold to the highest bidder. The purchasers remove their lots to private kottoos, where the oysters undergo the disagreeable process of rotting to enable the pearls to be washed out. The stench resulting from this decay is fearful, and it has often happened that the operations have had to be prematurely closed in consequence of the resulting outbreak of cholera. It says much for the careful sanitary arrangements made by the officials in charge that such outbreaks are not of recent occurrence.

The official estimate of the proceeds to be expected from this year's fishing was 400,000 rs.; but this estimate has been considerably exceeded, the returns having been 599,333 rs. To some considerable extent this increase is due to the im-

proved demand in India for pearls, the competition having been very keen. As yet, official returns have not been published; but the *Ceylon Observer* has kept its readers very fully informed of the results of each day's fishing, and of the prices obtained. The total number of days on which the weather and other conditions allowed of operations being conducted was forty, and the fishing finally closed on April 27. The number of oysters fished during that period is reported to have been about 17,000,000, and the average price realized for them about 24 rs. per thousand, though they occasionally brought as high prices as 43 rs. per thousand.—*Colonies and India.*

Japanese Lacquer and Paper.

The manufactures of lacquer and paper, two industries for which the Japanese are deservedly celebrated, were made special objects of study by Sir E. J. Reed on his recent visit to the Flowery Land, and the following notes are mainly taken from his interesting volumes:

The Japanese lacquer is laid usually upon articles of wood, and not upon articles of *papier-mâché*, as many suppose. It is produced from the sap of the *Rhus vernicifera*, which is taken in its natural state into a large wooden tub or vat, and then stirred in the sun with a large spatula, until its excess of water is evaporated. In some cases the varnish so produced undergoes careful straining; in others, it is mixed with sulphate of iron, with vermilion, with red oxide of iron, or with indigo; oil is sometimes employed, likewise powdered stone. Into some inferior varnishes, a sort of paste made of rice enters in considerable proportion. There are a dozen methods of employing the various varnishes, differing according to the nature of the object to be produced. In the best lacquer, numerous coatings are applied, dried, and polished successively. The first polishings are done with a stone named *tsu shimada* (suitable for hones), the latter by means of water, and a charcoal made from *Andromeda ovalifolia*, and the last with pulverized stag's horn. All the polishings are effected by the hand. When gold is used in smooth surface lacquers, where it is not to be in relief, the process is as follows: The design to be produced is traced on a leaf of paper, which is then reversed, and has repeated upon the opposite side of it the outlines and other features of the design, in a mixture of varnish and vermilion, softened over a mild fire. This side of the paper is then applied to the lacquer to be decorated, and the paper is rubbed and pressed upon it by means of a small spatula of bamboo. The transfer of the pattern from the paper to the lacquered surface is further assisted by gently beating the paper down with a small silken bag, containing powdered stone. The paper is than peeled off, and can be used again if desired. The slight relief of the pattern so produced upon the lacquer is rubbed down with carbon polish, and the design, and that alone, is then lightly covered with a thin layer of quickly drying varnish. Gold, in powder, is then applied to the moist surface by means of a camel-hair pencil if the gold powder be fine, and by means of a small tube if it be comparatively coarse and heavy. The article is then dried for a day in a warm closet, such as is used for drying the ordinary lacquer varnish.

The design is next lightly coated with a very thin layer of varnish, applied by means of paper steeped in it, and passed very delicately over the object, which is then redried in the closet. The object receives further extremely light coatings of varnish and subsequent polishings before it is complete. Silver is applied in powder in the same manner. When gold or silver is applied to designs in relief, the details of the process vary considerably, but the application of the metals is effected in substantially the same manner. When gold and silver are applied in leaf, they are laid upon the varnished surface prepared for them, and dealt with in the usual manner, the varnish acting as a "size" for the metallic leaf. When mother-of-pearl is used as an incrustation for lacquer it is laid on during the varnishing processes, earlier if it be thick than if it be thin, and the final polishing is proceeded with until the pearl is brought to the surface.

PAPER.

Besides the papers made from rags and rope-waste by European methods, the true Japanese papers are produced from a limited number of materials, the chief kinds being *Hishi*, from the *gampi* (*Wickstræmia canescens*) and allied plants, and *Kokushi*, from the *kozo*, *kodzu*, or paper-mulberry (*Broussonetia papyrifera*), which latter is the more important. The treatment of the *koso* plants for paper-making purposes is as follows:

They are cut into three foot lengths and steamed in a large boiler containing a little boiling water. The bark is then peeled off and steeped in water; the dark outer skin or rind is scraped off with a knife, and the scrapings are used to make inferior paper. The scraped and cleansed bark is arefully washed in running water, and then exposed to the sun until bleached sufficiently white. After this it is boiled in a lye formed with buckwheat ash, to remove gummy and resinous substances. The fibers are then readily separated. After cutting out knots of excessive hardness, the workmen beat the fiber into a pulp with wooden mallets upon blocks of stone. This pulp is united in tubs or vats with the needful quantity of water, to which is added a milky substance prepared with rice flour, and a gummy decoction from the bark of the *nori-noki* (*Hydrangea paniculata*), or from the root of the *tororo* (*Tororo hibiscus*). When the steeping in this mixture has proceeded sufficiently long, the pulp is spread out into sheets by means of fine sieves of bamboo and silk. After draining the sheets are transferred by means of brushes to drying boards.

Similar processes are employed for producing paper from the *gampi*. The product is very fine and supple, and admirably suited for taking transfer copies, besides possessing the advantage of not becoming worm eaten. Paper is also made from the *mitsu mata* (*Edgworthia papyrifera*).

An Improved Ammoniacal Manure.

A company has just been formed with objects which will probably be of great interest to gas manufacturers. Lieutenant-Colonel Bolton and Professor Wanklyn, working in conjunction with several well-known gas engineers, Mr. F. W. Hartley among the number, have for some time past been engaged at the South Metropolitan Gas Company's works in perfecting a process for the economical recovery of ammonia from crude gas, in the form of a solid manure or fertilizing agent. The *Journal of Gas Lighting* says that the process is reported to be remarkably simple, and is intended to be applied in the course of the ordinary operations of the purifying house, without special plant. Washing and scrubbing will, it is expected, be done away with in the new process, a considerable saving in plant being thus effected, in addition to which a common source of loss of illuminating power due to the absorption of hydrocarbons in the scrubbers will be avoided. The ammonia will be fixed in a dry form, sulphate of ammonia being procured, together with phosphate of lime in its best state, the compound thus presenting all the characteristics of a perfect manure. The only labor needed to prepare the material for sale, after it is taken from the purifiers, is the slight service of pulverizing it in an ordinary disintegrator, whereby it is reduced to an impalpable soluble powder. It is also claimed that the process eliminates a considerable portion of the sulphur compounds, thus rendering it a highly desirable aid to the complete purification of gas. The Ammoniated Superphosphate Company is the title of the new venture, which starts with a highly influential list of subscribers, headed by the Right Hon. Lyon Playfair, C.B., M.P., and there is every reason to expect that it will speedily be in a position to transact an important business.

Industrial Art Instruction in Philadelphia.

During the past summer classes in industrial and decorative art have been taught in one of the Philadelphia public schools, under the direction of Mr. Charles G. Leland.

In order not to interfere with the regular studies of the scholars during the day the classes were first held in the evening only. Afternoon classes were later established for those who could attend at that time. A large proportion of those applying for entrance to the classes wished for instruction with the view of becoming teachers, but very many were children of from twelve to fifteen years of age, who seized gladly this opportunity to learn how to make something salable. After three months' work specimens were forwarded to the School Board of what had been accomplished in painting, wood carving, needle work, and metal work. Painted plaques and tiles, carved walnut panels and brackets, doilies, tidies, chair backs, and hammered brass work were shown, none of which, however, represented more than the third attempt of any pupil, many being the first ones. The work is of such a character that, Mr. Leland says in his report to the school committee, "we are quite capable even now of producing work which would meet with ready sale, and if orders were given for ordinary sheet brass work and wood panels, suitable for common decoration, I would qualify all the scholars in a few days to fill them."

The instruction and practical work proposed for the Philadelphia schools cover the rudiments and simpler processes of tile painting, leather work, wood carving, braiding, netting and mat making, sheet metal work, inlaying, etching, papier mache work, glass work, pottery, drawn work, calabash work, sewn leather work, fan making, dye, or tapestry, painting, modeling in clay, art needle work, Indian work, stenciling, mosaic work, bamboo and rattan work, jewelry, rustic work, horn work, turning, basket making, outline embroidery, and illumination.

Castings of Delicate Natural Objects.

The following process is recommended by Abbass for producing metallic castings of flowers, leaves, insects, etc.:

The object, a dead beetle, for example, is first arranged in a natural position, and the feet are connected with an oval rim of wax. It is then fixed in the center of a paper or wooden box by means of pieces of fine wire, so that it is perfectly free, and thicker wires are run from the sides of the box to the object, which subsequently serve to form air channels in the mould by their removal. A wooden stick, tapering toward the bottom, is placed upon the back of the insect to produce a runner for casting. The box is then filled up with a paste of three parts of plaster of paris and one of brickdust, made up with a solution of alum and sal ammoniac. It is also well first to brush the object with this paste to prevent the formation of air bubbles. After the mould thus formed has set, the object is removed from the interior by first reducing it to ashes. It is therefore dried slowly, and finally heated gradually to a red heat, and then allowed to cool slowly to prevent the formation of flaws or cracks. The ashes are removed by pouring mercury into the cold mould and shaking it thoroughly before pouring it out, and repeating this operatiod several times. The thicker wires are then drawn out, and the mould needs simply to be thoroughly heated before it is filled with metal in order that the latter may flow into all portions of it. After it has become cold it is softened and carefully broken away from the casting.

AGRICULTURAL INVENTIONS.

Mr. Richard J. Gallway, of Austin, Texas, has patented an improved seed planter having several novel features, which cannot be fully described without engravings.

Mr. George S. Latta, of Berea, N. C., has patented an improved combination fork and rake, which can be readily adjusted for use in either capacity. The invention consists in constructing a combination fork and rake with a handle having sockets or keepers attached to its end, a head having a shank, a jointed brace hinged to the shank, and having a shoulder upon its rear part, the locking bar having a corresponding shoulder, and a screw band for clamping the various parts of the implement together, whereby the implement can be readily adjusted as a fork or a rake.

Messrs. Isaiah H. Reiner and Samuel Reiner, of Line Lexington, Pa., have patented an improved sulky harrow. The invention consists in improved mechanism for manipulating a harrow. It cannot be clearly described without engravings.

The Panama Canal.

Dr. Charles Peitzch, a German physician of New York, has just returned from Aspinwall and Panama, and gives a very gloomy account of the country and the prospects of the De Lesseps Canal scheme. "If any of your friends think of going to Panama," said the doctor to a *Tribune* reporter, "advise them not to. In all my travels I never saw a more sickly, poverty stricken, and forsaken people. I was induced to go there by the promise of a large business in my profession. There was plenty for me to do, but no money in it, and I came away as soon as I could. There are about 250 people at work on the Panama Canal, 200 of whom are negroes. Half of them are sick, haggard, and starving, and the death rate is alarming, although the facts are suppressed as much as possible. There are not more than 100 able-bodied men at work at any time, and the force is constantly being renewed, because the laborers fall victims to disease, then lose their places and starve, or die of fevers and a peculiar wasting away of the system. The canal company wants to get all the laborers possible, and it offers the inducement of high wages, board, plenty of work, and free passage. Agents gather laborers up wherever they can find them and take them by boat to Aspinwall and rail to Panama. They receive $17 a month, and the worst board imaginable. They are crowded into shanties and fed on the cheapest kinds of food: rice twice a day, tea or coffee in the morning only, salt beef once a day, and no bread; fresh meat, never. Once there, it is impossible for laborers ever to return, as the men have no money, and it costs $25 to ride back to Aspinwall, a distance of forty-seven and a half miles, and they are too weak to walk. White people soon become yellow and look like death, and beg tourists to take them away.

"Work is advancing very slowly on the canal, and there is nothing to show for the money spent. It is generally believed in that country that the canal will never be finished. It is about as wide as Broadway from house to house. There are some stakes driven down and planks laid along and the earth stirred up a little, but that is all. It seems hardly possible to live in that country. It is marshy and malarial, and infested with alligators and serpents and poisonous insects. I was bitten in the hand by an insect, and my arm has swollen up and been useless for a month. The population is composed of negroes and Spanish and French of the lowest class. The climate is warm—terribly warm—moist, and oppressive, and tends to induce the use of stimulants. St. Louis beer costs thiry-five cents a bottle, Milwaukee beer twenty-five cents. Whisky is cheap, and the best imported Holland gin only 40 cents a quart. Beef and fish are very plentiful and cheap, as are also fabrics. On the whole, the country is no place for any but a very patient man with plenty of money."

Farming by Telephone.

M. P. Dhamelincourt, of Hendebouville, France, makes use of a portable telephone apparatus, with which he directs works at a distance on his farm, thus saving the time and trouble necessary for a personal visit. His plan is simply to have a tripod carrying a movable roller, on which is wound a conducting cable composed of two insulated wires. Below this on a movable board is a small box, in which is placed a telephone and bell. The system allows the current to pass from the bell to the telephone without using a commutator. Thus, the telephone being at rest, the bell is in connection with the line, and when the telephone is in use the bell is cut out of the circuit. Another telephone and bell are fixed in the house of the farmer, with a commutator.

Spectra of Fire Flies.

During the past summer Mr. W. G. Levison, of Brooklyn, N.Y., has studied the spectra of the light of fire flies and other light-producing insects. He finds that the ordinary small species of fire fly gives a spectrum from which the blue and violet are omitted, and that in all cases examined the less refrangible rays predominate. Phosphorescent oils and glowing phosphorus give a spectrum consisting of green light only. A fire fly that is injured and glows permanently seems to give a nearly similar spectrum, but the bright light given by the insect when living affords an entirely different spectrum, as mentioned above.

The Study of American Antiquities.

The fourth congress of the "Learned Association of Americanists" will begin in Madrid, September 25, under the presidency of the King of Spain. There will be, at the same time and place, an exhibition of American antiquities. The Spanish Minister at Washington gives the following programme of subjects to be discussed:

The comparison of the three kingdoms of Cuzco, Trujillo, and Quito, which formed the empire of the Incas at the time of the conquest; the difference which their religion, legislation, language, architecture, customs, etc., presented; the nationalities which existed in Central America before the invasion of the Aztecs and other northern people and the formation of the Mexican Empire; the emigration of the people of Chibcha and their relations with Mexico and Peru; the music and dancing among the indigenous Americans; the military condition of the empires of Mexico and Peru before the discovery and conquest of the New World, and a comparison thereof with that of the other ancient races; the expedition before the time of Columbus of the Biscayans to Newfoundland and the neighboring coast countries; whether the voyages of Juan de Fuca and Lorenzo Ferrer Maldonado are apocryphal; the influence of the missionaries in spreading a knowledge of American geography; the geological proofs of the existence of the Atlantis of Plato, its fauna and its flora; the progress of American cartography; what have been the changes and other effects caused by the influence of the Plutonic forces of the globe, or by other natural causes, in the position, course, and flow of the water of the interior of America, in order to study the question not only from its historical, geographical, and climatological points of view, but also in view of the interest which it has for the present populations of America, in the sense of their development, well being, and civilization; whether it can be ascertained, from history and the study of geological phenomena at present found in the Island of Cuba, that the latter was united or not to the continent of America before its discovery by Columbus; American prehistoric archæology; the emblematic and religious value of the diverse types of idols, effigies, and images which are found in the Peruvian tombs; investigations concerning the "Usnus," "Xayhuas," "Sayanas," and other analogous monuments containing images, signs, or inscriptions; whether from the archæological investigations which have taken place in our day in the Island of Cuba, and from the general types of some of the idols found therein, it may be inferred that these idols must have belonged to other indigenous Cubans than those which Columbus found on the island; prehistoric anthropology; the nature of the principal contagious diseases which have been reciprocally communicated by the people of the Old and New Worlds; the nomenclature of the races and tribes of America before the conquest, and an ethnographical chart of the territory occupied by each one of them; whether there exists ethnographic affinity between the races of America and Oceanica; the Quipus, considered especially in their relations to the ancient systems of writing and the possibility of their translation; whether it is possible to reach a practical knowledge of the organization and construction of the indigenous languages by means of the past Latin dialects with which they have been compared by European philologists and investigators, and the bibliography of the vocabularies, grammars, and dictionaries of the American languages.

Acres of Yellow Lilies.

A correspondent of the *Evening Post* describes a remarkable floral display on a mill pond in Sharptown, N. J. Some four years ago there appeared in the pond a little patch of a gigantic species of water lily. In four years the patch has spread until it covers three or four acres. The flower and the plant which bears it are most remarkable. The leaves, almost round like the common lily-pad, are often two feet in diameter from edge to edge and as tough as several thicknesses of brown paper. Each leaf will easily support a pound weight. The water, when it breaks over the edge, forms a great globule that rolls over the green surface like quicksilver. The flower grows upon a strong stem four feet high, as thick as the end of a man's little finger, and as straight as a reed. A foot out of the water comes the blossom of a light but brilliant yellow, with many rows of petals. It is shaped like the ordinary white water lily, with fragrance quite as strong but not so delicate. The blossom is of wonderful size. When fully expanded it will measure six inches across, and at the same time three or four inches up and down. Two opposite petals can easily be stretched until they measure six inches from tip to tip, and the bud is as large as a good-sized bowl. The magnificence of the flower when in bloom is simply indescribable. Inside is a large round seed vessel surrounded by a mass of delicate silken filaments. In this vessel, some two inches across at its upper surface, and diminishing to half an inch where it joins the stem, there develop, in the autumn, seeds of the size of buckshot. These seeds the boys gather to eat the kernel, which tastes like the meat of the chestnut, hence the local title "chincapin" of the lily, the name also of the dwarf chestnut of this region. This great lily is rare in the United States. There is a small patch in a pond at Woodstown. It grows also in Oneida county, N. Y., in Sussex county, N. J., and in the Connecticut River near Lyme, Conn., where it is miscalled the Egyptian lotos. The display made by the acres of plants on the Sharpstown pond is most magnificent. The correspondent, who has seen the Kew Gardens near London and the great botanical grounds at Paris and Cologne, asserts without hesitation that if all the flowers in the three were put together they would not equal, as a spectacle, the lily plantation on Sharptown pond. Half the leaves rest on the water, the other half rise above it as a foil for the resplendent yellow beauties which blossom above them in thousands, one or two in every square foot of space. As the spectacle bursts upon one riding down the Sharptown road it seems as though a vast sheet of fiery splendor had been clipped from the yellow sunset sky and dropped on the murky waters.

New Jersey Marl.

The great marl belt of New Jersey stretches from the head of Delaware Bay northeastward to the coast opposite Staten Island, a distance of about one hundred miles. The belt varies from five to fifteen miles in width. At some places the marl crops out on the surface, and is as easily dug as common dirt; at others it lies fifteen or twenty feet deep, and must be taken out by machinery. The marl belongs to the cretaceous epoch of geology—the epoch which Dana describes as "the closing era of the reptilian age, remarkable for the genera of mollusks and reptiles which end with it, and also for the appearance during its progress of the modern types of plants and fishes." It was an age of finishing and of beginning. There are four great marl layers in New Jersey, made up of (1) the clay marls, 277 feet thick, with dark-colored clay as a large constituent element; (2) the lower marl bed, 30 feet thick, in which appears a greensand marl, much used for fertilizing; (3) the middle marl bed, 45 feet thick, where appears a marl of chocolate color and also of olive green; and (4) the upper marl bed, 37 feet thick, where are found two marls—ash colored and blue; making altogether 389 feet of marl strata under New Jersey. The marl was formed by the chemical decomposition of organic matter, chiefly shells, along with sand and other earthy substance. The geologists tell us that during the period of marl formation New Jersey must have risen and sunk in the waves several times, and that even now she is subsiding, as is shown by the encroachment of the ocean on her lower borders. The changes must have been slow, extending over measureless geological periods, but they were immense in their total. How illimitable must have been the ages to form even the single set of marl strata with their 389 feet of earthy compost!

Exactly what marl is chemically the following analysis of Woodstown marl—a fair specimen of other analyses—will show:

Phosphoric acid	2·65
Sulphuric acid	0·11
Silicic acid	49·73
Potash	6·81
Lime	1·05
Magnesia	1·81
Alumina	8·04
Oxide of iron	21 60
Water	7·04
	98·84

The value of potash, which acts like wood ashes, and of the phosphates is well known to many farmers. These are the chief fertilizing elements in marl.

Marl was first found in New Jersey in 1768. An Irishman in Monmouth County digging a ditch threw some of the greensand out on a meadow, where its fertilizing qualities were noticed. By the early part of this century it had come into pretty common use, until now it has become essential to successful agriculture throughout central New Jersey. In the whole State several millions of bushels are spread each year, and its use constantly increases. The farmers usually spread it in the autumn, putting sometimes several hundred bushels on an acre. Now and then they find a deposit on their own farms which can be dug with spades, but more often they have recourse to the systematically worked beds, where they pay forty cents for each load of twenty bushels. In Woodstown during autumnal days the marl wagons move through the streets almost in procession, and the roads for a quarter of a mile from the pits take their hue from the greensand which has sifted through the boards.

The marl is good for all crops; it renews them on exhausted land, it increases them on land already productive. For potato plants it is a specific, killing worms, enlarging the root, and making the potato smooth-skinned and fair. There is a marl, however, very common, and known locally as "poison marl," the effect of which is quite opposite. It contains an excess of copperas, which is deadly to the fields, killing every living plant for several years. Not uncommonly a stratum of good marl runs into one that is noxious, and serious injury to a farm follows. The poisonous marl, however, can be cured by mixing it with lime; and in that case it becomes superior for raising crops to the marl which does not have to be chemically treated. The poisonous marl is detected by the length of time that is needed to dry it after it is wet by rain. But the farmers have what they regard as a more radical test. If white clover grows on the marl a few days after it is thrown from the pit the compost is good; otherwise it is poisonous. The best marl has thus a singular affinity for the germs of white clover floating in the air, and in a few weeks the biggest heaps may become blanketed with the little flowers.

The more general results of the continuous use of marls on the soils of Salem and adjacent counties are very striking. Lands that used to be worth five dollars an acre have been enriched within a few years to a value of one or two hundred dollars an acre. The surface stratum of this county consists of a light sandy soil easily exhausted unless some artificial fertilizer is used; consequently it is not too much to say that the county has been absolutely reclaimed as to farming by the greensand which underlies it. The Salem farmers brag that no lands in the Union can compare with theirs in average selling value, and so long as ordinary farms here bring a hundred dollars an acre the boast seems justified. What is true of Salem County holds for most other parts of New Jersey through which the marl belt runs, and one effect has been to increase during the last half century the average value of the farm lands of the whole State in a most extraordinary manner. Probably 1,000 square miles in the wild southern counties of the State are absolutely unimproved, yet the new census is likely to show that New Jersey can sell her farms for more money per acre than any one of her sister States. The story of her agricultural redemption is registered in marl, and, though written in sand, the record only grows plainer with time.—*C. D., in Evening Post.*

RECENT INVENTIONS.

Mr. Willard D. Doremus, of Washington, D. C., has patented a lock so constructed that after the key is started to be moved forward to unlock the bolt it cannot be moved back again, but must complete its revolution before it can be withdrawn.

An improved process of and apparatus for extracting juice from sugar cane and other vegetable substances has been patented by Mr. George A. Bazé, of Havana, Cuba. The invention consists of an upright cylindrical vessel divided internally into two chambers by a perforated horizontal diaphragm, the upper chamber being designed for the reception of the crushed sugar cane or other vegetable to be treated, and the lower chamber for the reception of the juices extracted therefrom; and it further consists of a central vertical shaft carrying suitable spiral stirrers for agitating the contents of the upper chamber. It possesses other novel features which cannot be clearly described without engravings.

An improvement in steam grain driers has been patented by Mr. Henry Cutler, of North Wilbraham, Mass. The invention consists in a shaft made hollow at one end to receive the inlet steam, and with perforations at the other end to discharge the water of condensation, the head cast in one piece with one or more chambers, receiving steam through the conduction pipes connected with the cavity of the shaft and distributing the steam to the circulation pipes forming the heating surfaces, the return bends connecting the circulation pipes in pairs to induce circulation.

Mrs. Helen M. Snyder, of Uxbridge, Mass., has patented an improvement in chrome painting upon ferrotype and other pictures. This is a process of coloring or painting photographs and other pictures to beautify them and make them resemble oil paintings. The method of coloring or painting a picture consists of first coating the picture with a compound composed of chromic acid burned with alcohol, isinglass, and soap and sugar, then drying it under a screen, then coloring it with suitable water colors, then coating with a color or colors mixed with the compound of burned chromic acid, isinglass, and soap, and finally drying the picture.

Mr. William Haslup, of Sidney, Ohio, has patented an improved earth scraper, having its bottom formed of one piece of sheet or plate steel, with its sides and end or back bent or curved up, to which the sides and end of the scraper, made of a single piece of sheet iron or other metal, bent angularly to conform with the shape of the sides and end of the bottom, and the hooks for the attachment of the bail, are riveted, whereby great strength is given to the scraper in consequence of the double thickness of the metal where riveted together, and the strain on the hooks, in operating the scraper, is borne both by the sides and bottom of the scraper.

Mr. Willard D. Doremus, of Washington, D. C., has patented an improvement in locks designed principally for drawers and cupboards. It consists of a bolt provided with a spring for driving it into the locking position, combined with a catch for holding the bolt withdrawn, and a depressible thimble, sleeve, or exposed surface arranged about the keyhole, and adapted to be forced inwardly to allow the unlocked bolt to be shot from the action of the spring into a locking position without the application of the key.

Hunting in Greenwood.

Greenwood Cemetery embraces 500 acres and is traversed by twenty miles of drives. It is well named the City of the Dead, for it is already the final resting-place of more people than New York had when the cemetery was started forty years ago, or nearly 300,000 persons. It is also a considerable haunt of the living, many of this portion of its inhabitants causing no little trouble to the official trapper. More than 20,000 animals, large and small, have been shot or trapped within the cemetery bounds since 1876.

The largest game was a fox, trapped in 1878, and the smallest moles and ground mice. The official figures for five years (1876–1880) are as follows: Ground mice, 14,096; chipmunks, 2,853; moles, 2,390; snakes, 366; rats, 208; cats, 395; dogs, 137; skunks, 10; muskrats, 9; fox, 1; total, 20,465. All this work has been done by one man, who is expressly engaged for this purpose. His name is Fritz Wagner, but he is more familiarly known to the 250 men employed in the cemetery as the "Mole Catcher."

Business and Personal.

The Charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

Leather Belting, Rubber Belting, Packing and Hose Manufacturers' Supplies. Greene, Tweed & Co., N. Y.

"How to Keep Boilers Clean," and other valuable information for steam users and engineers. Book of sixty-four pages, published by Jas. F. Hotchkiss, 84 John St., New York, mailed free to any address.

Small Machine Shop for sale. List free. E. Side, 370 South First St., Brooklyn, E. D., N. Y.

Valuable Patent for sale.—Automatic Cigar Lighter. Crook, Herring & Co., cor. Centre and White Sts., N. Y.

Alden Crushers. Westinghouse Mach. Co., Pittsb'g, Pa.

No. 196,606. Processes for Manufacturing Paper Pulp. Douglas Hickox, Springfield, Ill. Patented October 30, 1877. Has been in constant use since 1878. The most perfect process in use on any kind of stock. Will sell a few States. Would like correspondence with manufacturers of pulping machinery. Address as above.

Blake's Belt Studs. The best fastening for leather and rubber belts. Greene, Tweed & Co., 118 Chambers St., N. Y

Supplee Steam Engine. See adv. p. 140.

Abbe Bolt Forging Machines and Palmer Power Hammer a specialty. S. C. Forsaith & Co., Manchester, N. H.

Supplement Catalogue.—Persons in pursuit of information on any special engineering, mechanical, or scientific subject, can have catalogue of contents of the SCIENTIFIC AMERICAN SUPPLEMENT sent to them free. The SUPPLEMENT contains lengthy articles embracing the whole range of engineering, mechanics, and physical science. Address Munn & Co., Publishers, New York.

List 26.—Description of 2,500 new and second-hand Machines, now ready for distribution. Send stamp for the same. S. C. Forsaith & Co., Manchester, N. H.

Combination Roll and Rubber Co., 27 Barclay St., N. Y. Wringer Rolls and Moulded Goods Specialties.

Punching Presses & Shears for Metal-workers, Power Drill Presses. $25 upward. Power & Foot Lathes. Low Prices. Peerless Punch & Shear Co., 115 S. Liberty St., N. Y.

Improved Skinner Portable Engines. Erie, Pa.

The Eureka Mower cuts a six foot swath easier than a side cut mower cuts four feet, and leaves the cut grass standing light and loose, curing in half the time. Send for circular. Eureka Mower Company, Towanda, Pa.

Pure Oak Leather Belting. C. W. Arny & Son, Manufacturers, Philadelphia. Correspondence solicited.

Presses & Dies. Ferracute Mach. Co., Bridgeton, N. J.

Split Pulleys at low prices, and of same strength and appearance as Whole Pulleys. Yocom & Son's Shafting Works, Drinker St., Philadelphia, Pa.

Wood-Working Machinery of Improved Design and Workmanship. Cordesman, Egan & Co., Cincinnati, O.

Experts in Patent Causes and Mechanical Counsel. Park Benjamin & Bro., 50 Astor House, New York.

Malleable and Gray Iron Castings, all descriptions, by Erie Malleable Iron Company, limited, Erie, Pa.

National Steel Tube Cleaner for boiler tubes. Adjustable, durable. Chalmers-Spence Co., 10 Cortlandt St., N. Y.

Corrugated Wrought Iron for Tires on Traction Engines, etc. Sole mfrs., H. Lloyd, Son & Co., Pittsb'g, Pa.

Best Oak Tanned Leather Belting. Wm. F. Forepaugh, Jr., & Bros., 58 Jefferson St., Philadelphia, Pa.

Nickel Plating.—Sole manufacturers cast nickel anodes, pure nickel salts, importers Vienna lime, crocus, etc. Hanson & Van Winkle, Newark, N. J., and 92 and 94 Liberty St., New York.

Presses, Dies, Tools for working Sheet Metals, etc. Fruit and other Can Tools. E. W. Bliss, Brooklyn, N. Y.

Peck's Patent Drop Press. See adv., page 141.

For best Duplex Injector, see Jenks' adv., p. 142.

For Mill Mach'y & Mill Furnishing, see illus. adv. p. 140.

C. B. Rogers & Co., Norwich, Conn., Wood Working Machinery of every kind. See adv., page 141.

Saw Mill Machinery. Stearns Mfg. Co. See p. 142.

For Pat. Safety Elevators, Hoisting Engines, Friction Clutch Pulleys, Cut-off Coupling, see Frisbie's ad. p. 158.

Safety Boilers. See Harrison Boiler Works adv., p. 157.

Long & Allstatter Co.'s Power Punch. See adv., p. 158.

Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co. Box 423, Pottsville, Pa. See p. 156.

Rollstone Mac. Co.'s Wood Working Mach'y ad. p. 157.

The Common Sense Dry Kiln prevents check, warp, or hardened surface. See St. Albans M'f'g Co.'s adv. p. 158.

Fire Brick, Tile, and Clay Retorts, all shapes. Borgner & O'Brien, M'f'rs, 23d St., above Race, Phila., Pa.

For best Portable Forges and Blacksmiths' Hand Blowers, address Buffalo Forge Co., Buffalo, N. Y.

The Brown Automatic Cut-off Engine; unexcelled for workmanship, economy, and durability. Write for information. C. H. Brown & Co., Fitchburg, Mass.

Ball's Variable Cut-off Engine. See adv., page 173.

Brass & Copper in sheets, wire & blanks. See ad. p. 173.

The Twin Rotary Pump. See adv., p. 141.

The Chester Steel Castings Co., office 407 Library St., Philadelphia, Pa., can prove by 15,000 Crank Shafts, and 10,000 Gear Wheels, now in use, the superiority of their Castings over all others. Circular and price list free.

Wren's Patent Grate Bar. See adv. page 173.

The Improved Hydraulic Jacks, Punches, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York.

Eagle Anvils, 10 cents per pound. Fully warranted.

Geiser's Patent Grain Thrasher, Peerless, Portable, and Traction Engine. Geiser M'f'g Co., Waynesboro, Pa.

Tight and Slack Barrel machinery a specialty. John Greenwood & Co., Rochester, N. Y. See illus. adv. p. 173.

For the manufacture of metallic shells, cups, ferrules, blanks, and any and all kinds of small press and stamped work in copper, brass, zinc, iron, or tin, address C. J. Godfrey & Son, Union City, Conn. The manufacture of small wares, notions, and novelties in the above line, a specialty. See advertisement on page 174.

Diamond Engineer, J. Dickinson, 64 Nassau St., N. Y.

Steam Engines; Eclipse Safety Sectional Boiler. Lambertville Iron Works, Lambertville, N. J. See ad. p. 157.

Berryman Feed Water Heater. See illus. adv., p. 173.

Houston's Sash Dovetailing Machine. See ad., p. 173.

New Economizer Portable Engine. See illus. adv. p. 173.

Hand and Power Bolt Cutters, Screw Plates, Taps in great variety. The Pratt & Whitney Co., Hartford, Ct.

Rue's New "Little Giant" Injector is much praised for its capacity, reliability, and long use without repairs. Rue Manufacturing Co., Philadelphia, Pa.

The Sweetland Chuck. See illus. adv., p. 172.

For Shafts, Pulleys, or Hangers, call and see stock kept at 79 Liberty St., N. Y. Wm. Sellers & Co.

Wm. Sellers & Co., Phila., have introduced a new injector, worked by a single motion of a lever.

Machine Knives for Wood-working Machinery, Book Binders, and Paper Mills. Also manufacturers of Soloman's Parallel Vise. Taylor, Stiles & Co., Riegelsville, N. J.

Skinner's Chuck. Universal, and Eccentric. See p. 173.

Don't buy a Steam Pump until you have written Valley Machine Co., Easthampton, Mass.

Use the Vacuum Oils. The best car, lubricating, engine, and cylinder oils made. Address Vacuum Oil Co., No. 3 Rochester Savings Bank, Rochester, N. Y.

For Machinists' Tools, see Whitcomb's adv., p. 173.

NEW BOOKS AND PUBLICATIONS.

ANALES DEL MINISTRO DE FOMENTO DE LA REPUBLICA MEXICANA. Tomo IV. Mexico, 1881.

This recently received volume of the Annals of the Minister of Public Works consists of 504 pages. About half the volume is devoted to a report by Professor Mariano Barcena, on the second exhibition of the "Clases Productore," an association of individuals representing the intelligence, capital, and labor of Talisco, organized in 1877, for the purpose of promoting the education of the masses, securing safety for life and property, introducing railways and telegraphs throughout the State, securing privileges to inventors, the diffusion of much and low-priced scientific literature, and the improvement of the country and its people generally. The report, which is very exhaustive, is followed by a description of the city of Gaudalajara by the same author. The other papers which go to make up the volume are: "A Memoir on the Geographical Positions of the Cities of Quéretaro, Zacatecas, and Durango, and in the Longitude of Mazatlan," by Leando Fernandez; "Periodical Phenomena of Vegetation for 1879," by Mariano Barcena; "Memoir on the Work done from January, 1878, to June, 1880, in the Central Astronomical Observatory," by Francisco Jimenez; and a "Report rendered to the Minister of Public Works by the Commission appointed to study the Most Effectual Means of Destroying the Locust." This report, like its predecessors, is handsomely printed, well illustrated, and altogether reflects great credit on the enterprising republic which publishes it.

REPORT OF THE STATE COMMISSIONERS OF FISHERIES. 1879–80. Harrisburg, Pa.

The Fish Commissioners of Pennsylvania are doing excellent work in protecting and extending the fisheries of the State. More than half of the hundred and fifty-three species of fish native to the State are edible and worthy of cultivation; and the numerous rivers of Pennsylvania afford good waters for carp, salmon trout, California salmon, and other importations. The report contains good descriptions of all the fish found in Pennsylvania, with engraved illustrations of forty of the more important species.

THE TELESCOPE. By Thomas Nolan, B.S. New York: D. Van Nostrand. 50 cents.

No. 51 of Van Nostrand's Science Series, discussing the optical principles of the telescope, with illustrations of the different types and styles of instruments.

MODERN MILLING. By Robert Grimshaw. Philadelphia: Henry Carey Baird & Co. 8vo, cloth, pp. 53. $1.

The substance of two popular lectures on modern milling and high roller milling, the purpose of which seems to have been to make clear the changes going on in milling and to set forth the advantages of certain styles of new machinery.

OBSERVATIONS OF THE TRANSIT OF VENUS, DECEMBER 8 and 9, 1874. Part I. Edited by Professor Simon Newcomb. Washington: Government Printing Office. 1880.

It is intended to issue the whole of the observations at the several stations, with their reductions in four parts. This, the first part, gives a general account of the operations of the Transit Commission, and reduction and discussion of the observations. Part II., which is soon to follow, will give in detail the observations made at each station, with their reduction. Part III. will be devoted to a discussion of the longitude of the stations; and Part IV. to measures of the photographs, with their reduction and discussions.

HARVARD AND ITS SURROUNDINGS. By Moses King. Cambridge: Charles W. Sever. Third edition, revised and enlarged. Cloth, $1.50.

A handsomely made little book which must commend itself to all who take an interest in Harvard College and its surroundings. Its illustrations comprise thirty or more heliotypes of buildings, etc., and nearly as many wood engravings.

PREDAZZO: A STUDY. By Ed. Reyer. Wien, 1881. Alfred Hölder. Pp. 55.

The author of this work is well known as an authority in tin and zinc mining industries, and has in this case slightly departed from his accustomed field and describes the geological formation of the mountains surrounding the hamlet of Predazzo in Northern Italy. Numerous cuts and a map accompany the interesting and carefully prepared work.

Notes & Queries

HINTS TO CORRESPONDENTS.

No attention will be paid to communications unless accompanied with the full name and address of the writer.

Names and addresses of correspondents will not be given to inquirers.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Correspondents whose inquiries do not appear after a reasonable time should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them.

Persons desiring special information which is purely of a personal character, and not of general interest, should remit from $1 to $5, according to the subject, as we cannot be expected to spend time and labor to obtain such information without remuneration.

Any numbers of the SCIENTIFIC AMERICAN SUPPLEMENT referred to in these columns may be had at this office. Price 10 cents each.

(1) E. E. M. asks: What would the effect be on the flues of an eight-horse locomotive boiler if the door is open when there is a fire in the furnace and a working pressure on the boiler? Would it tend to preserve the flues or would it tend to make them leaky? A. It would be likely to set them leaking, especially if the damper was to remain open, so that there was a draught of cold air through the flues.

(2) T. G. Y. asks: 1. Is there any chemical process by which I can remove the gray color from feathers and make them perfectly white? A. Feathers may be bleached by exposure to the vapor of burning sulphur (sulphurous acid) in a moist atmosphere, but it is usually necessary to remove the oily matters from them before they can be satisfactorily so bleached. This may be accomplished by immersing them for a short time in good naphtha or benzine, rinsing in a second vessel of the same, and thoroughly drying by exposure to the air. This treatment does not injure the feathers. 2. What dyes should be used to give a gray color to feathers that are naturally white? A. Use a weak aqueous solution of nigrosine.

(3) C. G. F. writes: 1. I have a figure of which I wish to make a mould of India-rubber, probably a quarter of an inch in thickness. How can I soften the pure rubber so as to do this—how prevent sticking to the cast? The mould is desired to be flexible and as soft as it can be kept. A. Use the purified gum rubber, and soften it by contact with hot water or steam, and mould by pressure. Use powdered soapstone to prevent sticking. See How to Make Rubber Stamps, in SUPPLEMENT, No. 83. 2. Also, what is the best bath for nickel plating? A. The double sulphate of nickel and ammonia dissolved in water is generally preferred. See article on Nickel Plating, page 153, vol. xliii.

(4) G. B. L. asks how plumbers burn perpendicular seams in lead tanks on thin sheet lead. A. The edges are brought together, hammered down into a channel cut out of wood, and secured with a few tacks. The hollow is then scraped clean with a scraper, rubbed over with tallow, and a stream of hot lead is poured into it, the surface being afterwards smoothed with a hot plumber's iron.

(5) J. A. asks for the best method of making the ornamentations on tin that look like crystals or like the frost on windows in winter. I have tried diluted sulphuric acid and citric acid, but have had poor success. Also, how to give the same different colors. A. Use nitric acid diluted somewhat with water. See that the plates are free from grease or oil first, and rinse them quickly in clean water on coming from the acid. They should not remain many minutes in the latter. The colors are imparted by washing them with very dilute shellac (or other) varnish colored with the aniline dyes or other suitable colors.

(6) C. A. B. writes: The shaft of my water wheel is upright, making 40 revolutions to the minute; on its top is a pulley 60 inches in diameter, driving one on another upright shaft 42 inches in diameter. On the second upright is a gear wheel, with 35 cogs, working into a gear wheel of 51 cogs on a horizontal shaft. On this horizontal shaft is a 78 inch pulley, which drives a 16 inch pulley on the end of my saw mandrel, running a 48 inch saw, which gives my saw about 191 revolutions, or about 2,400 feet per minute. Will my saw do as good work making that number of revolutions as it would do if geared higher? The belt that connects my 60 inch pulley on mill shaft and 42 inch pulley on upright, is a 12 inch belt. My difficulty is this: When my belt is tight enough to do good work it soon bursts; if left loose enough to prevent bursting it slips. Will you please suggest a remedy? I have thought of chain gearing, which would give me a positive motion, but have never seen any in use. Would you advise its use? If so, what size? A. You should speed up your saw to about 500 revolutions per minute. You will then have less feed per revolution, and your belt will stand.

(7) R. H. asks what to use for making rusty saws and shovels look bright and new. A. Scour with pumice stone powder moistened with muriatic acid diluted with about five volumes of water. Finish with emery cloth or paper and oil, and finally with cotton waste or a cloth and oil.

(8) R. D. S. writes: I have a tin roof painted with boiled linseed oil and oxide of iron. It does not wear well. What can I add to this mixture, and what proportions, to make it more durable? Would raw oil be better than boiled? A. Use good raw oil. It should be ground with fine (calcined) oxide. We know of no cheap substance that will materially improve its durability.

(9) W. A. asks (1) for the names of the poisonous snakes (if any) of New England. A. (1) The Northern rattlesnake and (2) Copperhead. 2. Is the milk adder poisonous? A. No.

(10) F. asks if an electric light can be run by a battery instead of engine; if there are companies that sell the lamps and batteries for the same, and if so, what would be the cost. A. Electric lights can be operated by batteries, but the method is very expensive and troublesome, and not to be recommended except for experimental purposes.

(11) J. A. B. asks how to dissolve gold for gilding china or glass that has to be burnt. A. Triturate gold leaf in a mortar with a little honey until reduced very fine; then dissolve out the honey with hot water, and mix the gold dust with a little gum water for use; or dissolve the gold in hot aqua regia, evaporate to dryness in a porcelain dish over a hot water bath, and dissolve in ether for use.

(12) P. S. N. writes: There is any amount of broken glass around here. Would there be any use made of it without the addition of any new material in making bottles and common glassware? A. If the glass is free from gross impurities all that is necessary is to crush it, wash free from earthy matter, etc., powder coarsely, and remelt. No addition need be made.

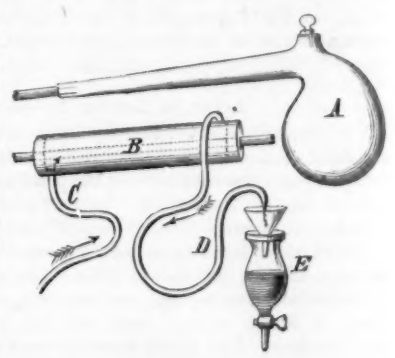
(13) H. A. I. asks for a receipt for making canvas waterproof, also to make straw board waterproof. A. See article on waterproofing, page 81, current volume of SCIENTIFIC AMERICAN.

(14) S. B. G. sends the following: A cider press, the beam of which is 1 foot by 2 feet by 25 feet long, and weight 48 lb. per cubic foot. Required the pressure on the cheese, which is 4 feet from the end of the beam which is in the post. A. Your beam, 1 foot by 2 feet by 25 feet long, at 48 lb. per cubic foot, would weigh 2,400 lb., and the center of gravity at mid length; hence your beam becomes a lever, with distance from fulcrum to press 4 feet, and from fulcrum to center of gravity of the beam 12½ feet, or 3⅛ leverages, and 2,400x3⅛=7,500 lb. pressure at the press.

(15) J. W. writes: 1. I have a water power of about 14 feet head, and a good supply of water, and wish to carry the power to a factory distant about 3,000 feet. Which would be the cheapest and most practicable, to do it by means of a wire rope transmission, or to use compressed air? A. By a wire rope. 2. Could you give me the name of any party transmitting power by compressed air that distance successfully? A. No, we do not think it has been practiced successfully for such a purpose.

(16) C. L. S. asks for a receipt for some transparent glaze that can be put on clay tobacco pipes with a moderate degree of heat, for instance such as is used by the pipe manufacturers in Powhattan County, Va., and at Akron, O. I am about to engage in the business of making pipes by machinery. I wish to use only a moderate degree of heat, so that in glazing the pipes will not be burned too hard. A. 1. Make a saturated solution of sugar of lead (lead acetate) in hot water. Dip the pipes in this, or apply it with a brush to the outside, then dry and expose in an open muffle at a low red heat until properly glazed. 2. Potassium carbonate, 1 part; borax, 5 parts; melt together in a sand crucible and pour out on an iron plate to cool, then powder and mix into a paste with a little turpentine oil for use. Apply with a brush or clean rag, and heat slowly in a muffle or oven to incipient redness.

(17) A. E. M. asks for an easy process for extracting the essence from flowers. A. The finer perfumes are usually extracted by distilling the flowers with water, and condensing the essential oils which pass over with the steam and separate from the water of condensation from the latter. The retort is preferably of earthenware or glass, and its beak is joined to the glass center tube of the condenser, B. The condenser is a cylinder of sheet metal closed at the ends by wooden plugs through which passes the glass tube; cold water flows in through the tube and escapes through D. The distilled liquids are collected in E, in which the essential oils separate and are drawn off, the water being returned to the retort with a fresh charge of flowers.



(18) A. W. S. writes for directions for putting lightning rods on a barn 40x100 feet, on the general principles involved in their erection for the protection of buildings. Some claim that insulation is necessary, while I maintain that the rods should come in direct contact with the wood or brick. Who is right? A. Without knowing the form of the roof of your barn it would be impossible to give specific information. In general terms, run your rod to the highest points on the barn. Use a rod at least five-eighths of an inch in diameter, and attach it directly to the barn without insulators. Screw joints together, and extend the lower end of the rod twenty feet away from the barn in a trench dug deep enough to reach earth that is always moist. Fill the trench around the rod with pounded coke. Connect gutters, pipes, and all metallic parts of the barn with the rod.

(19) C. B. C. asks for a receipt for a mixture that will keep a piccolo moist and make the tone clear without injuring the wood. A. Rub a little pure glycerine on the wood occasionally and then wipe it dry with a soft cloth.

(20) J. N. S. writes: I have a galvanizing wine press, and as you do not recommend the use of galvanized iron, can you give a formula for taking off

the amalgam, so as to leave the press safe to use for grapes, etc.? A. The coating of zinc may be removed by scouring with sand quartz moistened with muriatic acid diluted with three volumes of water or by boiling in a strong solution of potash. The latter process does not affect the iron.

(21) E. B. asks: Can you give me a simple process by which I can make ozone? A. Put a few sticks of clean phosphorus in a basin of water, half cover them with fresh cold water (soft), and put a closed bell jar or inverted glass vessel (clean) of any kind over all so as to confine the air above the phosphorus. In the course of an hour the air thus confined will be found charged with ozone.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

R. Q. and C.—No. 1 is pyromorphite—essentially $PbCl+3(3PbO\,[PO_5As_2O_5])$. No. 2 is spathic iron ore—carbonate of iron. No. 3 is impure barytes—sulphate of baryta. It is used in adulterating white lead, and alone as a white pigment.—Miss S. A.—The crystals are fluor—fluorspar. It is nearly pure fluoride of calcium. The powdered mineral exhibits the phenomenon of phosphorescence strongly when moderately heated in the dark.—J. B. H. M.—The clay is too impure to be of much value, even for brick making.—P. L.—It is arsenio siderite—an arsenite and arsenate of lime and iron.—J. M. McB.—The box marked P 1. contains sand and sulphide of iron—of no value.—W. I. F.—The conglomerate contains a little sulphide and carbonate of copper—not enough to make it valuable as an ore.—F. S. P.—It is not corundum or emery, but magnetite—protosesquioxide of iron—S. S. M.—A fine silicious clay containing much iron oxide—of little value.—T. W. & Co.—It is quartz and limestone containing galena—lead sulphide—and pyrites. Galena is a valuable ore of lead.—W. H. L.—The clay contains only a trace of lime phosphate, but much carbonate.—S. T. D.—It would require an assay to determine the value of your ore. The rock is quartz. J. McC.—The fine particles are mica and sulphide of iron—the sand contains no valuable metals.—G. M. R.—Such mica is of very little commercial value. The demand is for the colorless or white mica. The stain cannot be removed without spoiling the sheets.—L. J.—It contains galena—lead sulphide—and probably a little silver. An assay would be advisable.

[OFFICIAL.]

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FOR WHICH

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AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

A printed copy of the specification and drawing of any patent in the annexed list, also of any patent issued since 1866, will be furnished from this office for 25 cents. In ordering please state the number and date of the patent desired and remit to Munn & Co., 37 Park Row, New York city. We also furnish copies of patents granted prior to 1866; but at increased cost, as the specifications not being printed, must be copied by hand.

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Vulcanizing flasks, J. S. Campbell, New York city.

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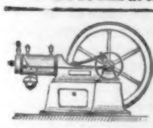

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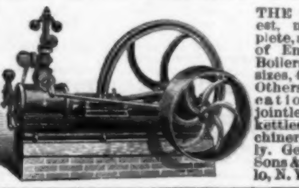

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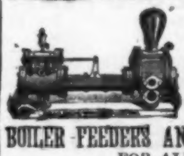

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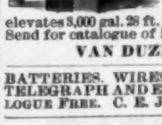

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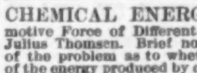

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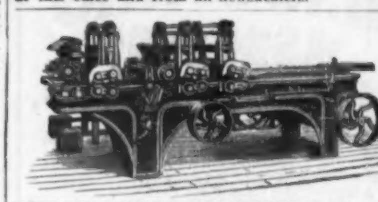

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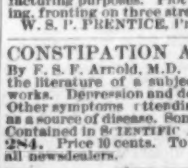

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